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DEVELOPMENT OF A SAMPLE AIR QUALITY
MAINTENANCE PLAN FOR SAN DIEGO

Andrew T. Creekmore, Jr.

TRW Systems Group

Prepared for:

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FOR SAN DIEGO**

by

TRW, Inc.
One Space Park Drive
Redondo Beach, California 90278

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Prepared for

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Office of Air and Waste Management
Office of Air Quality Planning Standards
Research Triangle Park, N. C. 27711

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PREFACE

This report documents the results of a ten week study to develop a sample air quality maintenance plan for San Diego. The principal objectives of the study were to:

- 1) Apply EPA air quality maintenance plan guidelines developed through both in-house (EPA) and contractor efforts;
- 2) identify and attempt to overcome problem areas encountered in the application of said guidelines;
- 3) provide a basis for eventual development of the air quality maintenance plan for San Diego by the appropriate state and local agencies.

Substantial comment has been received on the initial draft of this report from EPA, the State of California Air Resources Board, and the local agencies in the San Diego area including the Air Pollution Control District and the Comprehensive Planning Organization. Where appropriate, such comments have been incorporated into the present document.

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TABLE OF CONTENTS

	<u>Page</u>
1.0 EXECUTIVE SUMMARY	1
2.0 INTRODUCTION	7
2.1 Baseline Air Quality	7
2.2 Baseline Emissions Inventory	10
2.3 Present Government Organization for Air Quality Management in the San Diego Region	11
2.3.1 State Level	12
2.3.2 County Level	13
2.3.3 Regional Level	14
2.3.4 Local Level	15
2.3.5 Regional Special Purpose Agencies	15
2.3.6 Federal Level	16
3.0 EMISSION INVENTORY PROJECTIONS	19
3.1 Land Use and Transportation Projections	19
3.2 EPA Promulgated Plan for Attainment of Oxidant Standards	20
3.3 Technical Assumptions	21
3.3.1 Reactive Hydrocarbons and Carbon Monoxide	21
3.3.2 Particulate Matter	30
3.4 Inventory Projections to 1985	37
3.4.1 Reactive Hydrocarbons and Carbon Monoxide	37
3.4.2 Particulate Matter	37
3.4.3 Oxides of Nitrogen and Sulfur Dioxide	46
3.5 Comparison with the Results of Previous Studies	47
3.5.1 The Rand Study	47
3.5.2 The California Air Resources Board Implementation Plan	49
3.5.3 The EPA Promulgated Plan for Oxidant Control	49
3.5.4 The Local Agency Task Force Plan for Attainment	50
3.5.5 California Air Resources Board Maintenance Area Designation Study	50
3.6 Anticipated Fuel Shortage Impacts	51

TABLE OF CONTENTS (Continued)

	<u>Page</u>
4.0 ATTAINMENT STRATEGIES	54
4.1 Reactive Hydrocarbon Reduction Measures	54
4.2 Particulate Matter	56
5.0 POTENTIAL MEASURES FOR MAINTENANCE OF AIR QUALITY	59
5.1 State Level Land Use Control Measures	59
5.2 Regional Level Land Use Control Measures	61
5.3 Local Level Land Use Control Measures	62
5.4 The Land Use Planning Context	64
5.5 Two Candidate Approaches for Incorporating Air Quality Management into the San Diego Land-Use Decision-Making Process	73
5.5.1 Alternative "A" AQMP Process Carried Out by CPO	74
5.5.2 Alternative "B" AQMP Process Carried Out by APCD	76
5.5.3 Discussion	76
6.0 LOCAL CONSIDERATIONS IN LAND USE PLANNING	80
6.1 The Delphi Panel	81
7.0 AN AIR QUALITY MAINTENANCE PLAN FOR SAN DIEGO	97
7.1 The Land Use Control Element	97
7.2 Maintenance Requirements Beyond 1985	99
7.3 Status of Technological Controls	102

LIST OF APPENDICES

	<u>Page</u>
APPENDIX A - San Diego Air Quality Data	A-1
APPENDIX B - San Diego Population Data	B-1
APPENDIX C - NEDS Update	C-1
APPENDIX D - Delphi Panel Members and Results	D-1
APPENDIX E - Recent California Environmental and Land Use Legislation	E-1
APPENDIX F - Emission Projection Modeling	F-1
APPENDIX G - Technical Assumption Meeting	G-1
APPENDIX H - Plume Computations	H-1
APPENDIX I - Study Contacts	I-1
APPENDIX J - Letter from Frank Covington to the Ad Hoc - San Diego Air Quality Task Force	J-1
APPENDIX K - 1. Opinion of the State of California Attorney General Concerning APCD Indirect Source Review Authority	K-1
2. Opinion of the State of California Fourth District Court of Appeals, Western Oil and Gas Association, et al., v. Orange County Air Pollution Control District, et al.	K-16
APPENDIX L - Potential Conflicts with Other Programs	L-1

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1-1 Suggested Maintenance Plan for San Diego.	4
2-1 San Diego County Air Quality Summary.	9
2-2 1972 Emission Inventory for the San Diego AQCR.	10
3-1 Forecasts of Aviation Demand, San Diego Region.	23
3-2 Aircraft Emission Projection.	24
3-3 Exhaust Emission Factors for LDV's.	26
3-4 Exhaust Deterioration Factors	27
3-5 LDV Control Measure Effectiveness Assumptions	28
3-6 1972 UMT Data	29
3-7 Projected UMT Data.	29
3-8 Industrial Employment Projection Categories	32
3-9 Industrial Employment	33
3-10 Light Duty Vehicle Assumptions.	36
3-11 San Diego County Emission Inventory	38
3-12 AES1 Total Hydrocarbon Inventory and Projection	42
3-13 Reactive Hydrocarbon Emission Projections for the Uncontrolled Engine Category.	42
3-14 Particulate Emissions	43
5-1 Land Use Control Measures for Regional Land Use Planning and Air Quality Maintenance	70
6-1 Organization of Delphi Survey	85
6-2 Summary of Round One Results.	86
6-3 Summary of Round Two Results.	87
6-4 Comparison of "Best" (Round Two) and "Overall Attractive- ness" (Round Three and Four) Rankings	89
6-5 Results of Round Four - Rankings of Implementation Obstacles	89
6-6 Results of Rounds Four and Five - Comparison of Means and Standard Deviations for Most Important Implementa- tion Obstacles.	92
6-7 Results of Round Six and Seven - Summary of Most Effective Control Measures.	94

LIST OF TABLES (continued)

<u>Table</u>		<u>Page</u>
A-1	Federal Ambient Air Quality Standards	A-11
A-2	List of Air Monitoring Stations In San Diego County . .	A-12
A-3	Oxidant-Annual Average of Maximum Hourly Average for San Diego County.	A-13
A-4	Maximum Hourly Average Oxidant Concentrations for San Diego County.	A-14
A-5	Carbon Monoxide-Average of Daily Maximum Hourly Average for San Diego County.	A-15
A-6	Maximum Carbon Monoxide Values for San Diego County . .	A-16
A-7	First and Second Maximum Eight Hour Averages for 1972 Carbon Monoxide.	A-16
A-8	Suspended Particulate Concentrations in San Diego County.	A-17
A-9	Maximum Suspended Particulate Concentrations.	A-17
A-10	Sulfur Dioxide Concentrations in San Diego County . . .	A-18
A-11	Nitrogen Dioxide Concentrations in San Diego County . .	A-18
B-1	Population Projections for San Diego County	B-4
D-1	List of People Who Were Notified of the Delphi Panel. .	D-3
D-2	Delphi Panel Members.	D-5
D-3	Results of San Diego Delphi Panel	D-6
F-1	CPO Model Sequence.	F-2
F-2	Light and Heavy Duty Vehicle Emissions.	F-16

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
2-1 San Diego Intrastate AQCR	8
3-1 Emission Projection for Reactive Hydrocarbons	40
3-2 Emission Projection for Carbon Monoxide	41
3-3 Projected Emissions of Particulate Matter	45
5-1 Alternative One - AQMP Process Carried Out by CPO	75
5-2 Alternative Two - AQMP Process Carried Out by APCD	77
A-1 Historical Oxidant Trend for San Diego County	A-19
A-2 Seasonal Trend for Oxidant	A-20
A-3 Diurnal Pattern for Oxidant	A-22
A-4 Cumulative Frequency Distribution for Oxidant - Chollas Heights	A-23
A-5 Cumulative Frequency Distribution for Oxidant - Mission Valley	A-23
A-6 Cumulative Frequency Distribution for Oxidant - Chula Vista	A-24
A-7 Cumulative Frequency Distribution for Oxidant - El Cajon	A-24
A-8 Cumulative Frequency Distribution for Oxidant - Escondido	A-25
A-9 Cumulative Frequency Distribution for Oxidant - Oceanside	A-25
A-10 Cumulative Frequency Distribution for Oxidant - Downtown San Diego	A-26
A-11 Carbon Monoxide Seasonal Variation, 1972	A-27
A-12 Cumulative Frequency Distribution for Carbon Monoxide - Hourly Averages Downtown 1972	A-28
A-13 Cumulative Frequency Distribution for Carbon Monoxide - Hourly Averages Downtown 1963-1967	A-28
A-14 Cumulative Frequency Distribution for Suspended Particulate Matter (Quarterly Geometric Means)	A-29
A-15 Seasonal Trend for Suspended Particulate Matter (Quarterly Geometric Means)	A-30
B-1 Population Projections for San Diego County	B-5
F-1 IPEF Model: Interrelationships Between the Demographic and Economic Sectors	F-4
F-2 Illustrative Structure of "PLUM"	F-6

LIST OF FIGURES, continued

<u>Figure</u>		<u>Page</u>
F-3	General Form of Spatial Allocation Function in "PLUM"	F-8
H-1	Point Source Grid Display	H-2
H-2	Grid Boundaries for the Emissions Simulator	H-3
H-3	Grid Display of Emissions from Freeway Traffic	H-6
L-1	San Diego Water Basin	L-11

1.0 EXECUTIVE SUMMARY

The San Diego region has, in terms of meteorological conditions, a high potential for the buildup of air contaminants. Thus, despite the fact that total pollutant emissions are lower than most of the critical air pollution regions across the nation, the resulting pollutant concentration levels indicate that a severe air quality problem exists. Violations of the National Ambient Air Quality Standards occur for oxidant, carbon monoxide and particulate matter. Peak measurements of 0.32 ppm for oxidant (hourly average), 19 ppm for CO (8-hour-average), and $97 \mu\text{g}/\text{M}^3$ for particulates (annual geometric mean) in 1972 indicate that emission reductions of 75% for reactive hydrocarbons, 53% for carbon monoxide, and 55% for particulate matter will be required in order to meet the national standards for air quality. Oxides of nitrogen and sulfur dioxide are not a problem at present, nor are they projected to become a problem through 1985.

The emission inventories for reactive hydrocarbons, carbon monoxide, and particulate matter have been projected to 1985 under the assumptions that (a) the promulgated EPA transportation control plan will go into effect as scheduled (including an 11% reduction for vehicle miles travelled) and all elements of the plan will achieve the degree of control assumed by EPA; and (b) the Controlled Trends alternative of the Regional Comprehensive Plan will be implemented, and the employment and vehicle miles traveled (VMT) projected to result from this alternative will actually materialize (less the 11% reduction due to the transportation control plan). The set of technical assumptions concerning the air quality/emission level relationship, emission factors, hydrocarbon reactivity factors, growth factors, and control efficiencies for the various measures are considered, on the whole, to result in an optimistic appraisal of future air quality in San Diego. Alternative assumptions may lead to significantly different conclusions. Nevertheless, it is felt that future air quality is not likely to be better than that portrayed in this report. The projections indicate the following:

- The primary standards for carbon monoxide will be attained by 1977 and maintained thereafter through 1985. Attainment by 1977 is contingent upon the assumed VMT reduction actually occurring.

- In the absence of controls over and above what is presently contained in the final EPA implementation plan for San Diego, attainment of the National Ambient Air Quality Standard for oxidant is not likely to occur by 1985.

The sum total of the control programs planned by EPA, the California Air Resources Board, and the San Diego County Air Pollution Control District have been projected to fall short of attaining the oxidant standard in San Diego through 1985. Beyond 1985, the effect of the federal new car control program is expected to be offset by growth in other emission categories as well as by growth in vehicle miles traveled.

- In the absence of controls over and above what is presently enforced by EPA and the San Diego County Air Pollution Control District, attainment of either the primary or secondary National Ambient Air Quality Standards for particulate matter is not likely to occur in San Diego through 1985.

The recent tightening of APCD regulations concerning particulate matter emissions from stationary sources, as well as the reduction in auto exhaust particulates anticipated to result from the use of oxidizing catalytic converters, will be offset by growth in emissions from other source categories, most notably fuel combustion. Additional data is required to identify from which source categories further reductions should occur in order to meet the secondary standard.

- By 1985, emissions from sources for which little or no controls are presently planned will dominate the emission inventory for reactive hydrocarbons.

These sources include aircraft, heavy duty gasoline powered motor vehicles, motorcycles, off-road heavy duty vehicles, and wild fires. Each source category is comparable to the others in magnitude, and together these sources account for 58% of the total inventory in 1985. Aside from a 14% contribution from light duty vehicles, the remaining inventory is divided into small portions amongst other source categories.

Additional control measures required for attainment of the oxidant standard are contingent upon the date by which attainment must occur. If it is 1977, a 100% light duty vehicle VMT reduction would be required. By 1980, light duty vehicle emissions which had previously dominated the inventory will be drastically reduced, due to the federal motor vehicle control program.

Conversely, other emission sources which had previously accounted for only small fractions of the inventory will have been inexorably growing in magnitude. Equity considerations as well as the technological limitations of deriving further reductions from source categories already under stringent control argue in favor of attacking those sources which have not previously been subject to comparable control programs. Therefore, an 80% reduction in emission from heavy duty vehicles, motorcycles, and aircraft would be required. This would have to be accomplished through stringent standards for new heavy duty vehicles and motorcycles, oxidizing catalyst retrofit programs for those vehicles in these two categories already in use, and the institutionalization of ground operating procedure modifications for both civilian and military aircraft. By 1985, a 60% reduction from the same three categories would be required. In this case, the retrofit of in-use heavy duty vehicles and motorcycles would no longer be an effective measure.

It is anticipated that no matter what sources receive further control, the costs of such control will be high since the more cost-effective control options will have already been exercised.

Additional control measures required for attainment of the particulate standard are contingent upon the acquisition of additional data concerning the chemical composition of the particulate samples collected. Such data would serve to identify the major contributors to the high levels measured, and hence the appropriate control strategy. Preliminary plume model computations suggest that the most significant contributors to the particulate loading at El Cajon (where the peak annual geometric mean was measured) are automobiles. If further data confirms this result, an appropriate control measure would be the removal of sulfur from gasoline.

It should be noted that none of the attainment measures outlined are within the jurisdiction of any of the local agencies in San Diego. Such controls must be initiated by EPA and/or the State Air Resources Board.

The fundamental problem of air quality maintenance planning is, how can air quality be maintained in the face of continuing urban growth and development? In addressing this problem, an intimate connection must be made with the regional comprehensive plan:

- The regional comprehensive plan can serve as a framework for designating the land use elements of the AQMP.

Recognizing that there are weaknesses and inadequacies in regional comprehensive planning, it is still felt that the air quality maintenance plan (AQMP) should be, to the maximum extent possible, consistent with the regional comprehensive plan. Air quality is only one of many considerations in local and regional objectives for directing future growth; currently the only vehicle for expressing these is the comprehensive plan. The regional growth policies adopted by the Board of Directors of the Comprehensive Planning Organization are consistent with the goals of air quality maintenance. Thus, the AQMP may be considered to provide an enforcement vehicle for those policies.

- The procedure by which overall growth and development may occur without an associated degradation of air quality is through increasingly stringent control programs concerning both technological and land-use elements.

An air quality maintenance plan consists of two distinct yet interacting elements - a technological or direct source control element and a land-use or indirect source control element. In San Diego, the oxidant problem is such that technological controls must be extended to their maximum if there is to be any flexibility allowed in the land-use control element. A suggested maintenance plan is summarized below:

Table 1-1. Suggested* Maintenance Plan for San Diego

<u>Technological Control Element</u>	<u>Land-Use Control Element</u>
● 90% control of heavy duty vehicle reactive hydrocarbon emissions	● Emission allocation procedure (SB 1543 or equivalent)
● 90% control of motorcycle reactive hydrocarbon emissions	● Direct and indirect source review, and EIR review (CEQA)
● 90% control of aircraft reactive hydrocarbon emissions	● Capital facility ordinances, development timing controls, and taxation policy to preserve undeveloped areas

* Due to the time constraints imposed upon this study, a detailed examination of the feasibility and effectiveness of these measures was not possible. Hence, they are suggested for further study, rather than recommended.

It should be noted that the degree of control required to maintain the air quality standards is greater than that required for attainment. This is a direct consequence of the growth in regional activity that is projected to occur through 1995 under the Controlled Trends alternative. Therefore, it is suggested that the maintenance requirements of the Clean Air Act provide the binding constraint for air pollution control in San Diego.

EPA is currently examining the feasibility of obtaining effective control over motorcycles and aircraft. If the stringent control indicated here cannot be obtained within the 1985-1995 time frame, the burden of control will shift to the land-use control element of the AQMP. Since the land use control element is to be used to ensure that the "Controlled Trends" policies are adhered to, any additional control burden imposed by a failure in the technological control element will dictate that the land use controls must be utilized to limit growth in a fashion which goes beyond the enforcement of the adopted growth management policies. This potential eventuality is of tremendous significance to the future growth and development of the San Diego region. The implications are far-reaching and may lead to a direct conflict between air quality goals, as defined in the Clean Air Act, and other public values.

Three alternative institutional arrangements for administering the preparation and implementation of an air quality maintenance plan for San Diego have been identified. One alternative would have the Comprehensive Planning Organization play the lead role. A second alternative would have the Air Pollution Control District lead, while a third alternative would have CPO and the APCD share the lead through the formation of a joint governing committee. The principal difference between the alternatives is the assignment of jurisdiction for indirect source review. As each alternative has its own set of problems, no recommendation is made concerning which would be most appropriate. What should be remembered, however, is that no single agency in San Diego has the total expertise, experience, and resources required for the successful planning and implementation of an AQMP. Therefore, no matter what the institutional arrangement, close cooperation and interdependency between agencies will be required.

It is difficult to be optimistic about either the prospects for achieving the photochemical oxidant air quality standard by 1985 or for maintaining it thereafter. Less of a problem, but nevertheless significant, is the achievement and maintenance of the particulate air quality standard. Numerous difficulties ranging from available technology and excessive control costs to political-institutional constraints and the public acceptability of controls have resulted in the present dilemma. The problems are deep seated and unlikely to be resolved in the near term without the concerted efforts and cooperation of all the agencies involved in the air quality maintenance planning process.

2.0 INTRODUCTION

The San Diego Intrastate AQCR, also known as the San Diego Air Basin, is located in the southwest corner of the state and consists of the western two-thirds of San Diego County. It is bounded on the east by the summit of the peninsular range, on the north by Orange County, on the south and west by Mexico and the Pacific Ocean, respectively. The airshed has a land area of approximately 3040 square miles and, as of 1970, a population of some 1.36 million people and 790,000 motor vehicles. The population is concentrated primarily in the city of San Diego and the incorporated areas along the coast. Figure 2-1 illustrates the location and area covered by the air basin.

Air pollution control in the region is primarily the responsibility of the San Diego County APCD. Since the airshed is contained within one county, no additional regional coordinating council is required for emissions control, as in some of the other multi-county airsheds within the state.

Overall, the data bases in San Diego are quite good. More often than not, the problem is not the lack of available data but attempting to reconcile the differences between several different data sets. Frequently, this problem is as sensitive to the political environment as it is to technical judgments.

2.1 BASELINE AIR QUALITY

The San Diego air quality maintenance area suffers from a high frequency of occurrence of both low level inversions and low wind speed. Accordingly, it has one of the highest potentials for the build-up of high concentrations of air pollutants in the nation. (2-2)

As in many areas of California, the predominant air pollution problem has been photochemical oxidants, primarily ozone. This implies a stringent control program of its precursors -- reactive hydrocarbons and to a lesser extent, nitrogen oxides. Preliminary air quality maintenance area designations by the California Air Resources Board (2-1) project photochemical oxidants.



Source: California Air Resources Board

Figure 2-1. San Diego Intrastate AQCR

carbon monoxide, and total suspended particles to exceed the NAAQS between 1980-85 in San Diego. Sulfur dioxide and nitrogen dioxide are projected not to exceed the NAAQS standards for the same time frame. Table 2-1 presents the 1972 reference air quality readings for San Diego as well as the emission reductions required for each critical pollutant to meet the NAAQS.

Table 2-1. San Diego County Air Quality Summary

<u>Pollutant</u>	<u>Current Level</u>	<u>Applicable Standard</u>	<u>% Rollback Required</u>
Oxidant	0.32 ppm (1 hour maximum)	.08 ppm	75%
Carbon Monoxide	19 ppm (8 hour average)	9 ppm	53%
Suspended Particulate Matter	97 $\mu\text{g}/\text{M}^3$ (annual geometric mean)	60 $\mu\text{g}/\text{M}^3$	55% *
Nitrogen Dioxide	.04 ppm (annual average)	.05 ppm	0
Sulfur Dioxide	.005 ppm (annual average)	.03 ppm	0
SO ₂	.019 ppm (24-hour average)	.14 ppm	0

*Assumes an uncontrollable background of 30 $\mu\text{g}/\text{M}^3$. Emissions of particulate matter must be rolled back to the secondary standard due to the fact that the originally approved state implementation plan indicated that the secondary standard for particulate matter would be met in San Diego.

An analysis of the air quality data available from the Air Pollution Control District, the California Air Resources Board, and the National Air Sampling Network is contained in Appendix A. This analysis has led to the following conclusions:

- Maximum values for oxidant and carbon monoxide predicted by the Larsen statistical analysis of 1972 data gave no reason to reject the observed 0.32 ppm peak oxidant concentration or the 19 ppm 8 hour CO peak concentration in San Diego County. These values are therefore used for calculating rollback requirements.

- Oxidant maxima and yearly averages are similar in magnitude at several sites in San Diego County. This confirms the regional nature of the oxidant problem, and indicates that emission reductions are required on a regional basis.
- Oxidant concentrations at all stations show a seasonal peak in late summer in addition to a daily peak in the early afternoon. The latter finding, together with the results of the Larsen analysis of the available air quality data, suggests that transport from other areas is not a significant factor influencing high oxidant levels in San Diego County.
- Carbon monoxide and particulate matter, in contrast to oxidant, show seasonal maxima in winter rather than summer. In the case of particulate matter, this suggests that photochemical aerosol is not a significant problem in San Diego.

2.2 BASELINE EMISSIONS INVENTORY

A summary of the 1972 emission inventory for San Diego County is presented in Table 2-2.

Table 2-2. 1972 Emission Inventory for the San Diego AQCR (tons/day)

Source Category	Reactive Hydrocarbons	CO	NO _x	SO _x	Particulate Matter
<u>Stationary Sources</u>					
Chemical	-	-	-	-	0.3
Metallurgical	-	-	-	-	0.1
Mineral	-	-	-	-	17.9
Organic Solvents	16.7	-	-	-	-
Gasoline Marketing	33.2	-	-	-	-
Fuel Combustion	1.8	4.3	78.6	30.4	10.9
Waste Disposal	1.9	8.0	0.2	-	1.6
Miscellaneous Stationary Sources	7.1	30.8	0.8	-	19.7
<u>Mobile Sources</u>					
Gasoline-Powered Motor Vehicles	130.2	915.	30.0	3.8	7.8
Diesels	0.8	4.6	7.6	0.5	0.3
Uncontrolled Engines	14.8	120.0	7.1	0.5	1.9
Aircraft	7.1	28.2	3.1	0.6	0.3
Ships & Railroads	0.2	0.2	0.3	0.3	0.2
Total	214.0	1111.1	127.7	36.1	61.0

As is apparent from this table, gasoline powered motor vehicles dominate the inventories for reactive hydrocarbons and carbon monoxide. In the case of particulate matter, the mineral, fuel combustion, miscellaneous (wild fires and structural fires), and motor vehicle source categories are the most significant contributors. Projections of these inventories to 1985 are presented in Section 3 of this report, along with a more detailed breakdown of the 1972 baseline inventory.

2.3 PRESENT GOVERNMENT ORGANIZATION FOR AIR QUALITY MANAGEMENT IN THE SAN DIEGO REGION (LEGAL AUTHORITY AND JURISDICTION)

"As lawyers for the State we have had to sue under a myriad of environmental laws, and the first point we made was that fragmented efforts to control the environment through single purpose agencies are doomed to failure, and probably self-defeating.... regulation of air, water, noise and solid waste cannot be dealt with effectively without land use regulation, but land use regulation alone solves nothing. California can no longer afford the luxury of special purpose regulatory agencies, doing their own thing to the dismay of the regulated, the confusion of other agencies and the detriment of the State as a whole." *

The Federal Clean Air Act of 1970 prescribed national ambient air quality standards and charged the states with implementing plans to attain and maintain these standards. Section 110 of the Act gives the states authorization to include "land use and transportation controls... necessary to insure attainment and maintenance of these standards."

The present government organization for air quality management in San Diego suffers from the common problem of institutional fragmentation. Conflicts in air quality management are particularly likely because air, being a regional resource, is influenced by land use, transportation, and other planning decisions. Development decisions are made incrementally by the local governments and without full comprehension of what their growth is doing to regional air quality. At present, air pollution controls imposed at the state or regional level are not incorporated into the land use planning process. Moreover, the present institutional framework for air quality management, being singled out from land use commissions and other resource management institutions (e.g. Water Quality Control Boards,

*Evelle Younger, State Attorney, addressing the Pacific Homebuilders Association in San Francisco at the Fairmont Hotel, June 6, 1974.

Coastal Commissions, etc.), does not encourage a balanced approach to environmentally enlightened land-use planning.

2.3.1 The State Level

Created in 1967 under the Mulford-Carrell Act, the California Air Resources Board (ARB) is charged with managing the state's air resources. The ARB retains the responsibility for developing and enforcing motor vehicle pollution control standards. Fifty local air pollution control districts have been delegated primary responsibility for planning and enforcement of stationary source controls, while the ARB is to intercede only in cases of local nonperformance.

The Air Resources Board is developing a program to coordinate air resources management programs with land use planning throughout the State. In 1973, a land use planning group with expertise in land use planning, systems analysis, meteorology, and air pollution emissions was created. This group will develop and evaluate methods of relating land use and transportation planning to air quality.

The land use planning group is developing strategies and techniques for insuring that air quality goals will be achieved and maintained in the longer term (10 to 20 years and longer). The group attempts to influence decision making so that future growth and development in the State of California will allow air resources management to be in harmony with social and economic goals.

The land use planning group works with the State Department of Transportation, the State Office of Planning and Research, other State agencies, local air pollution control districts, and regional and local planning authorities. The group coordinates its activities with the Federal Environmental Protection Agency.

The Air Resources Board also reviews environmental impact reports (submitted either directly to the ARB or through the State Clearinghouse) on construction projects which may have a significant effect on air quality. ARB review provides a basis for integrating air quality considerations into decisions of other State and local agencies on power plants, highways, wastewater treatment projects, and other projects and developments having a potential impact on air quality.

2.3.2 County Level

In San Diego, air pollution control is primarily the responsibility of the County Air Pollution Control District (APCD), a single purpose agency charged with regulating stationary sources of air pollution. The APCD is considered a county health function and is now under the County Department of Public Health. The APCD reports to the County Administrator and the five County Supervisors. Approximately 82 percent of San Diego County's total land area is under the County Board of Supervisor's jurisdictional control, and all development proposals within this area are subject to their review. It should be noted that the APCD's review jurisdiction includes the entire San Diego County, a significantly larger area than the AQCR and the AQMA which only include approximately the western two-thirds of the county.

The APCD has traditionally conducted permit review for 1) all new and existing stationary air pollution sources, and 2) review of visible emissions from mobile sources such as automobiles and ships. Additionally, the APCD submits comments to lead agencies on Environmental Impact Reports and Environmental Impact Statements.

Separate from the County APCD is a county-wide planning department called the Environmental Development Agency (EDA). This agency consists of the Environmental Review Board (ERB), the Planning Department, the Office of Regional Transportation and Land Use Planning and the Office of Environmental Management (OEM). The Office of Environmental Management is the policy analysis arm of the Environmental Development Agency. OEM has no review powers on new development; the ERB is responsible for EIR review, but ERB review comments are sent to the County Planning Commission.

EDA, in addition to being under the control of the County Supervisors, lacks any A-95 review powers. A-95 is a review process by which designated regional and state agencies may prepare comments on all federally funded projects. Title IV of the 1968 Intergovernmental Cooperation Act (Section 401B) requires all viewpoints (national, state, regional, and local) to be considered in planning federally assisted programs and projects. Section 401c further requires that the programs and projects be consistent with the objectives of state, regional, and local plans. In April 1973, the State of California Resources Agency incorporated review of all EIR's requiring federal grants or issuance of state permits into the A-95 process.

2.3.3 Regional Level

The Comprehensive Planning Organization (CPO) is the council of governments for the San Diego region. Its members include the City of San Diego, the County of San Diego, and the twelve incorporated cities in the County, and CalTrans, an ex-officio member, of the State of California. In addition to serving as the A-95 clearinghouse, CPO functions as an agent of federal and state policies, procedures and requirements. CPO also reviews and certifies state and federal projects to insure compatibility with the Regional Comprehensive Plan since it is designated by the state as the regional transportation agency. CPO's Board of Directors recently organized a special ad hoc air quality task force to address the issue of impacts the Regional Comprehensive Plan would have on air quality. The task force is composed of a policy committee and resource panel, consisting of elected officials, community leaders, citizen experts, and various local, state, and federal agencies concerned with air quality, transportation and land-use controls. The City of Tijuana, Mexico, is also an ex-officio member.

The role of the ad hoc air quality task force is: 1) to coordinate and develop a total package of reasonable and locally acceptable air quality plans and implementation programs; 2) to provide a mechanism for various community interest groups; and 3) to allow local inputs into the planning process. More recently, EPA Region IX has asked this policy group to develop a consensus among the local governments on how the functions of

indirect source review, parking facility review, and parking management plans can be implemented. (See Appendix J) After the group makes its findings, EPA will officially delegate the responsibility for implementing the aforementioned policies to a local agency.

2.3.4 Local Level

Separate from the county and regional government jurisdictions are the thirteen separate units of local government; each of the thirteen cities has its own council and land use decision making body. The result is less than optimal intra-city cooperation on issues of land use control, growth, resource management, and air pollution. The lack of coordinated planning leaves each city and the county (for the unincorporated areas) free to assign its own interpretation of "costs" which they use in their particular equation for land use decisions ... and consequently for their air resources.

2.3.5 Regional Special Purpose Agencies

The Local Agency Formation Commission (LAFCO) is still conducting Spheres of Influence studies in the San Diego area. The aim of their research is to 1) identify the unincorporated hot spots in the county where development pressures will likely necessitate their future incorporation by one of the 13 cities; 2) determine the unincorporated areas which will demand an urban level of municipal services. LAFCO's operations are hoped by some to have a major influence on future land use patterns in the region. By outlining annexation boundaries and permitting cities to exercise limited regulatory control on new development in pre-annexation areas, it is hoped that cities will have more control over the tempo and quality of their growth.

In actual practice, the effectiveness of LAFCO has been mixed. In the San Francisco Bay Area, for example, the influence LAFCO may have on future development is entirely dependent on whether the cities in the region will agree on the land areas in which they will provide future urban services. This task requires each city to outline its capital improvement program and to designate in its general plan where future development should occur.

The inherent problems which may arise in San Diego are as follows:

1. Cities must reach mutual agreement on growth so that a regional growth policy can begin to be formulated. Such a policy will require consensus of at least 14 different land use agencies.
2. Presently there is no effective link between county comprehensive planning and the decision-making being made by the Board of Supervisors.
3. The land use and open space elements of the County General Plan must be consistent with the goals and objectives of LAFCO.

Another special regional agency is the San Diego Coast Regional Commission, which is charged with preparing a comprehensive plan for the preservation, protection, restoration and enhancement of the coastal zone.

The Commission recognizes that the problem of air pollution is regional in nature and believes the attainment and maintenance of air quality standards must be approached on a regional basis. The Commission's primary role has been to help facilitate land use management of the non-urbanized coastal areas; one major defeat in this effort to date has been in the City of Oceanside where the courts denied the Commission the right to withhold a construction permit for an 11-story hotel. In the absence of local initiation by the San Diego Coast Regional Commission, this particular attempt to withhold a building permit was finally taken by the State Coastal Commission. (See Appendix L for further discussion of the Coastal Commission.)

2.3.6 Federal Level

Operating somewhat peripherally from the foregoing state, regional and local jurisdictional structure in San Diego, is the Department of the Navy. Naval activities represent a significant portion of land use activity in the region and obviously have a bearing on San Diego's future growth. For instance, under recent Naval directives, additional ships were reassigned to the San Diego base. No Environmental Impact Statement

was filed on this major realignment until citizen action demanded that the Navy address questions regarding the need for possible new support facilities, etc.

The Environmental Protection Agency has not been successful in filing a "309 action" to the CEQ under the Clean Air Act which would require federal activities of this nature in San Diego to comply with the National Environmental Policy Act. Locally, there is little demonstrated coordination of naval activities with long range planning activities in San Diego. Furthermore, federal installations claim statutory exemption from any form of state review. Consequently, military installations, activities and any resulting pollutant discharges are not subject to state review.

The aforementioned institutional description is indicative of a common problem. That there is a definite relationship between land use and subsequent air quality is undeniable and recognized by planners at all levels; but the task of translating desirable air quality standards into the land use control arena suffers from the fragmentation of jurisdictional power for land use decision making.

REFERENCES

- 2-1 State of California, The Resources Agency, Air Resources Board,
"Identification of Air Quality Maintenance Areas," Staff Report,
June 13, 1974.
- 2-2 Holzworth, G. C., "A Study of Air Pollution Potential for the
Western United States," Journal of Applied Meteorology, Vol 1,
pages 366-382, 1962.

3.0 EMISSION INVENTORY PROJECTIONS

3.1 LAND-USE AND TRANSPORTATION PROJECTIONS

As mentioned in Section 2, the Comprehensive Planning Organization is responsible for regional land-use and transportation planning in San Diego. CPO has made projections to the year 1995 of population, employment and land-use under four alternative growth scenarios:

- Existing Trends
- Controlled Trends
- Radial Corridors
- Multiple Centers

The Existing Trends alternative consisted of an extrapolation of present trends in urbanization and automobile dependence. Under Controlled Trends, population growth is not diminished but is channelled into specific areas. Higher density development is encouraged in areas which are already urbanized, with the emphasis on improving bus service within individual communities. The Radial Corridors alternative placed heavy dependence on a fixed rail and/or guideway mass transit system in determining the projected urban form. The Multiple Centers alternative was directed toward the development of several urban "centers" around which development would occur.*

The projections of population, employment, and land-use were made with the aid of two separate computer models -- the Interactive Population and Employment Forecasting Model (IPEF) and the Urban Development Model (UDM). The IPEF projection is similar to the California Department of Finance Series D-100 projections, as shown in Appendix B.

*The CPO Board of Directors recently approved a set of regional development policies which are a mixture of the Controlled Trends and Radial Corridors alternatives. The development policies are essentially Controlled Trends but the transit system is to be a fixed guideway system, lesser in extent than that envisioned under the Radial Corridors alternative, with an extensive feeder bus network. The CPO staff is presently preparing a revised set of projections for land-use, transit ridership, and VMT under the approved policies.

The Urban Development Model is the same as the Projective Land-Use Model (PLUM) implemented in the San Francisco Bay Area. Briefly, this model accepts the aggregated county population and employment forecast from IPEF, distributes these among a multitude of small sub-areas within the county, and computes the resulting land acreages devoted to various purposes within each sub-area.

Projections of traffic volumes and transit ridership are made in conjunction with the California Department of Transportation (CalTrans). CalTrans utilizes the standard modeling sequence of trip generation, trip distribution, modal split, and traffic network assignment in order to project these key parameters. Aside from the normal origin-destination survey and gravity model techniques, one of the most up-to-date and sophisticated mode split models is employed.

A more detailed description of the aforementioned projection techniques is contained in Appendix F.

3.2 THE EPA PROMULGATED PLAN FOR ATTAINMENT OF THE OXIDANT STANDARD

On November 12, 1973, EPA published its final regulations for the control of reactive hydrocarbon emissions necessary for attainment of the National Ambient Air Quality Standard for oxidant.³⁻¹ The plan consisted the following elements:

- Degreaser substitution to non-reactive solvents
- Control of dry cleaning operations
- Metal surface coating substitution to non-reactive solvents
- Control of petroleum marketing evaporative emissions
- Federal aircraft emission control program
- Anticipated federal motorcycle control program
- Mandatory inspection and maintenance of all light duty vehicles
- The State of California VSAD retrofit for 1966-70 model year light duty vehicles

- VMT reduction measures resulting in an 11% reduction in light duty vehicle VMT
- Additional VMT reductions necessary to attain the standard

The inclusion of the last measure indicates that EPA was aware that the preceding set of control measures would not be sufficient to meet the air quality standard for oxidant by 1977.

3.3 TECHNICAL ASSUMPTIONS

As with any projection or prediction of a future situation, certain assumptions had to be made concerning the effectiveness of various control measures, and the appropriateness of various emission factors and reactivity factors for different source categories. This section summarizes the technical assumptions used in this study. In the case of reactive hydrocarbon emissions, the bulk of the assumptions were determined at a meeting between representatives from EPA, the California Air Resources Board, the San Diego County APCD, and other organizations, on October 15, 1973. The minutes of that meeting are reprinted as Appendix G to this report.

3.3.1 Reactive Hydrocarbons and Carbon Monoxide

Organic Solvents

EPA promulgated regulations call for an 85-100% reduction of emissions due to metal surface coating operations through the substitution of non-reactive solvents. A 100% reduction has been assumed for this source category. The regulations further call for a 90% reduction from dry cleaning operations through the use of activated carbon adsorption systems, and a 100% reduction from degreasing operations via the substitution of non-reactive solvents for this purpose.

The reactivity of the emissions from these sources was chosen to be consistent with the Los Angeles APCD Rule 66 definition of reactive compounds. Growth in emissions from this source category has been assumed to be proportional to population growth.

Petroleum Marketing

The San Diego County APCD has enacted a stringent rule for the recovery of evaporative hydrocarbon losses due to the marketing of petroleum products, most notably gasoline. The rule calls for vapor recovery of disposal systems that have a 90% efficiency to be installed on bulk terminals and vehicle service facilities by the end of 1974.

The reactivity of emissions from these sources is assumed to be 93%, according to the latest EPA information, while growth in emissions from this source category is assumed proportional to the growth in VMT.

Fuel Combustion

No controls have been promulgated with regard to hydrocarbon emissions where a 100% reactivity factor has been assumed, in accordance with the October 15, 1973 meeting. See Section 3.3.2 concerning growth rate assumptions.

Diesels

EPA emission factors were combined with the EPA-sanctioned 99% reactivity factor for emissions in this source category. Diesel VMT estimates were obtained from the San Diego County APCD. Growth in this source category is assumed to be proportional to the growth in total VMT.

Wild Fires

Emissions due to wild fires cannot be ignored in an emission inventory of reactive hydrocarbons, since it is precisely during the warm summer months that wild fires are most likely to occur. There appears to be some difference of opinion regarding the assumption of a 100% reactivity for wild fire emissions. The San Diego County APCD assumed a 100% reactivity in their 1972 inventory, while the California Air Resources Board used a 10% reactivity in their designation of air quality maintenance areas (3-11). However, in keeping with the policy of regarding all emissions from combustion processes as being reactive (see the technical assumptions meeting, Appendix G), the 100% reactivity has been used for this study.

Aircraft

Data concerning aircraft emissions in 1972 were obtained from the San Diego County Air Pollution Control District, where 90% reactivity has been assumed in accordance with the October 15 meeting. Also in accordance with the October 15 meeting, a 30% reduction in emissions from commercial (civilian) operations has been assumed for the 1977 and later inventories. Projections of aircraft activity were provided by the Comprehensive Planning Organization and are reproduced in Table 3-1. These projections were used to generate the aircraft inventory projection shown in Table 3-2.

Table 3-1. Forecasts of Aviation Demand,
San Diego Region

<u>Year</u>	<u>Air Carrier Operations (Thousand Movements)</u>	<u>Military A/C Operations (Thousand Movements)</u>
1970 (Act)	78	681
1971	83	721
1972	89	764
1973	95	809
1974	102	859
1975	110	910
1980	139	910
1985	190	910
1990	247	910
1995	303	910
2000	662	910

Source: Comprehensive Planning Organization

Table 3-2. Aircraft Emission Projection (Tons/Day)

	<u>THC</u>						
	1972*	1973	1974	1975	1977**	1980	1985
Commercial	3.867	4.10	4.39	4.74	5.29	6.05	8.26
Military	4.073	4.31	4.58	4.85	4.85	4.85	4.85
TOTAL	7.94	8.41	8.97	9.59	10.14	10.90	13.11
TOTAL with 30% reduction from commercial	--	--	--	--	8.55	9.09	10.63

	<u>RHC</u>						
	1972*	1973	1974	1975	1977**	1980	1985
Commercial	3.45	3.66	3.92	4.23	4.72	5.37	7.34
Military	3.67	3.89	4.13	4.37	4.37	4.37	4.37
TOTAL	7.12	7.55	8.05	8.60	9.09	9.74	11.71
TOTAL with 30% reduction from commercial	--	--	--	--	7.67	8.13	9.51

	<u>CO</u>						
	1972*	1973	1974	1975	1977**	1980	1985
Commercial	19.9	21.1	22.6	24.4	27.2	31.1	42.5
Military	8.2	8.68	9.22	9.76	9.76	9.76	9.76
TOTAL	28.1	29.78	31.82	34.16	36.96	40.86	52.26

	<u>PARTICULATES</u>						
	1972*	1973	1974	1975	1977**	1980	1985
Commercial	.146	.155	.166	.179	.200	.229	.313
Military	.209	.221	.235	.249	.249	.249	.249
TOTAL	.355	.376	.401	.428	.449	.478	.562

*Baseline emissions obtained from the San Diego County
Air Pollution Control District

**Linear Interpolation

Uncontrolled Engines

This source category consists of exempted vehicles, competition vehicles, motorcycles, dune buggies, lawn and garden equipment, farm equipment, and off-road heavy duty vehicles and equipment. A recent study by Automotive Environmental Systems, Inc. (AESI) for the California Air Resources Board was used to estimate both baseline and projected emissions in this category. (3-2)

The EPA promulgated regulation for motorcycles calls for a 50% reduction from new 2-stroke motorcycles beginning in 1977 and a roughly 90% reduction from all new motorcycles (such that they comply with new car emission standards) beginning in 1979. If the proper regulations are not promulgated to ensure that such reductions will occur, the originally proposed ban on 2-stroke motorcycle use during daylight hours of the "smog season" (May-October) will go into effect. For the purposes of this study, it has been assumed that the appropriate regulations will be promulgated such that the motorcycle ban will not go into effect.

Light-Duty Vehicles

There are a number of assumptions with regard to the projection of light duty vehicle emissions which resulted from the October 15 meeting.

- a) Emission factors and deterioration factors developed by the Rand Corporation were used instead of the more generally used EPA factors. Tables 3-3 and 3-4 contain a comparison of the two sets of factors. Rand emission factors are slightly higher than EPA's, but the Rand deterioration factors are generally lower. Curiously, Rand's deterioration factors are a function of vehicle age only, and not model year.
- b) The assumed effectiveness of various LDV control measures is summarized in Table 3-5. In the case of the inspection/maintenance program, the control effectiveness required by EPA in their regulations was assumed for this study, rather than the effectiveness agreed to in the October 15 meeting. All other reduction factors shown in Table 3-5 were selected at the October 15 meeting.

Table 3-3. Exhaust Emission Factors for LDV's (Grams/Mile)

<u>YEAR</u>	<u>THC</u>		<u>CO</u>	
	<u>RAND</u> ⁽³⁻³⁾	<u>EPA</u> ⁽³⁻⁴⁾	<u>RAND</u> ⁽³⁻³⁾	<u>EPA</u> ⁽³⁻⁴⁾
≥ 1977	0.36	0.23	2.9	1.8
1976	0.36	0.23	2.9	1.8
1975	0.80	0.33	7.7	2.8
1974	2.4	2.7	19.0	19.0
1973	2.4	2.7	19.0	19.0
1972	2.5	2.7	19.0	19.0
1971	2.9	2.9	34.0	34.0
1970	3.6	3.6	36.0	36.0
1969	4.4	4.4	39.0	39.0
1968	4.5	4.5	46.0	46.0
1967	4.5	4.6	50.0	50.0
1966	4.8	6.0	50.0	51.0
≤ 1965	12.0	8.8	113.5	87.0

Table 3-4. Exhaust Deterioration Factors

THC		VEHICLE AGE									
		0	1	2	3	4	5	6	7	8	≥ 9
Post 1974	Rand	1.063	1.149	1.199	1.229	1.252	1.266	1.276	1.284	1.291	1.296
	EPA	1.00	1.14	1.30	1.44	1.55	1.67	1.77	1.88	1.96	2.07
1970-74	Rand	1.063	1.149	1.199	1.229	1.252	1.266	1.276	1.284	1.291	1.296
	EPA	1.00	1.05	1.10	1.13	1.15	1.17	1.20	1.22	1.24	1.26
1969	Rand	1.063	1.149	1.199	1.229	1.252	1.266	1.276	1.284	1.291	1.296
	EPA	1.00	1.10	1.16	1.18	1.21	1.23	1.25	1.28	1.29	1.31
1968	Rand	1.063	1.149	1.199	1.229	1.252	1.266	1.276	1.284	1.291	1.296
	EPA	1.00	1.12	1.18	1.21	1.23	1.26	1.28	1.30	1.32	1.35
1967	Rand	1.063	1.149	1.199	1.229	1.252	1.266	1.276	1.284	1.291	1.296
	EPA	1.00	1.07	1.10	1.12	1.14	1.15	1.17	1.18	1.20	1.21
1966	Rand	1.063	1.149	1.199	1.229	1.252	1.266	1.276	1.284	1.291	1.296
	EPA	1.00	1.14	1.22	1.25	1.27	1.29	1.30	1.32	1.35	1.35
Pre 1966	Rand	1.063	1.149	1.199	1.229	1.252	1.266	1.276	1.284	1.291	1.296
	EPA	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

CO		0	1	2	3	4	5	6	7	8	≥ 9
Post 1974	Rand	1.055	1.111	1.165	1.186	1.195	1.199	1.200	1.200	1.201	1.201
	EPA	1.00	1.16	1.34	1.50	1.62	1.75	1.88	2.00	2.10	2.22
1970-74	Rand	1.055	1.111	1.165	1.186	1.195	1.199	1.200	1.200	1.201	1.201
	EPA	1.00	1.18	1.32	1.38	1.40	1.44	1.47	1.50	1.51	1.56
1969	Rand	1.055	1.111	1.165	1.186	1.195	1.199	1.200	1.200	1.201	1.201
	EPA	1.00	1.42	1.53	1.59	1.63	1.68	1.71	1.75	1.79	1.82
1968	Rand	1.055	1.111	1.165	1.186	1.195	1.199	1.200	1.200	1.201	1.201
	EPA	1.00	1.24	1.35	1.41	1.47	1.53	1.58	1.63	1.67	1.72
1967	Rand	1.055	1.111	1.165	1.186	1.195	1.199	1.200	1.200	1.201	1.201
	EPA	1.00	1.11	1.18	1.23	1.29	1.35	1.40	1.46	1.50	1.56
1966	Rand	1.055	1.111	1.165	1.186	1.195	1.199	1.200	1.200	1.201	1.201
	EPA	1.00	1.13	1.21	1.24	1.25	1.28	1.29	1.31	1.32	1.34
Pre 1966	Rand	1.055	1.111	1.165	1.186	1.195	1.199	1.200	1.200	1.201	1.201
	EPA	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 3-5. LDV Control Measure Effectiveness Assumptions

<u>Measure</u>	<u>RHC Reduction,%</u>	<u>CO Reduction,%</u>
Inspection/Maintenance	15	12
Retrofit (1955-65 Models)	25	28
Retrofit (1966-70 Models)	14	10
Oxidizing Catalyst Retrofit	70	60
Vehicles Eligible for Catalyst Retrofit:		
	<u>Model Year</u>	<u>% of Vehicles Retrofitable</u>
	1966-70	60
	1971	75
	1972-74	95

- c) EPA speed correction factors were used for this study, although it was agreed at the October 15 meeting that speed correction factors should not be used since they are based on limited data. It is felt that despite the fact that the factors are based on limited data, larger errors would be incurred by not using the correction factors than by using them. In addition, since data was available concerning freeway and non-freeway VMT, different speed correction factors were applied to each component. (51 mph for freeways and 30 mph for city streets were the assumed average speeds).
- d) Conflicting VMT information was obtained from the county APCD and CPO/CalTrans. Tables 3-6 and 3-7 summarize this information. Since the only source of VMT projections was the CPO/CalTrans modeling effort, the VMT in Table 3-7 was used in order to maintain consistency between the baseline and projected inventories. However, the VMT breakdown shown in Table 3-6 was applied to this data in order to determine the LDV and HDV fractions of the total VMT. Additionally, since the 1972 VMT computed by the APCD was slightly greater than the 1975 VMT produced by the models, the 1975 VMT was assumed to occur in 1972. A linear interpolation was then made to 1995 to obtain VMT in the intermediate years.

Finally, an 11% reduction in VMT was assumed to occur in 1977 and subsequent years as a result of the VMT reduction measures promulgated by EPA. This reduction figure is identical to that used by EPA in their final rulemaking.

Table 3-6. 1972 VMT Data

<u>Vehicle Category</u>	<u>No. of Vehicles</u>	<u>Avg. Annual Mileage</u>	<u>Total Annual VMT</u>	<u>% of Total</u>
Light duty vehicles	714,828	9,398	6,717,953,544	86%
Heavy duty vehicles	55,674	10,519	585,634,806	7.5%
Diesels	6,554	53,458	350,363,732	4.5%
Motorcycles				
2-stroke	4,637	5,000	23,185,000	2.0%
4-stroke	26,278	5,000	131,390,000	
Average Total Daily VMT:	21,393,225			
<u>Source:</u> San Diego County Air Pollution Control District				

Table 3-7. Projected VMT Data

Year	Avg. Daily VMT	% HDV VMT	Avg. Fwy Speed	Avg. Non-Fwy. Speed
1975	20.9 Million (9.8 Street 11.1 Fwy)	4%	50.34	29.66
1980	24.8	4	-	-
1985	30.2	4	-	-
1990	35.7	4	-	-
1995	38.8 Million (17.0 Street 21.8 Fwy)	4	50.75	29.83
Source: CPO/CalTrans Controlled Trends 1995 Projection				

- e) The reactivity of LDV and HDV exhaust emissions was assumed to be 75% in both cases. Crankcase and evaporative emissions were assumed to be 95% reactive in both cases.

No one really knows whether the emission reductions anticipated to result from the promulgated control strategy will actually occur, or whether such reductions will result in a commensurate reduction in observed oxidant levels. Serious questions remain with regard to the appropriate

reactivity factors for such key source categories as aircraft, diesels, wild fires, and other open burning emissions. Likewise, the growth rate of motorcycle registrations as well as the turnover rate of the motorcycle population are key to determining the effect of the anticipated federal new motorcycle control program. Even in the case of automobile emission and deterioration factors (for which two sets of data were available for this study) much uncertainty remains, especially with regard to the speed correction factors and the deterioration factors for future model years.

Thus, in the face of such uncertainty, working assumptions are necessary in order to provide some basis upon which to proceed in a meaningful control strategy.

The preceding assumptions are, on the whole, considered to represent an optimistic interpretation of probable future events. The appropriateness of these assumptions as opposed to any other reasonable alternative set remains a moot question.

3.3.2 Particulate Matter

This section details the assumptions and methods used in projecting particulate emissions in the San Diego AQCR for the year 1985. Baseline emissions for 1972 were obtained from the San Diego County APCD.

Stationary Sources

Sources reporting no emissions in 1972 are expected to continue doing so through 1985. For all other sources (listed below) the following methodology was used:

<u>Emission Source Category</u>	<u>Assumption #</u>
Process losses - point sources	
(1) Chemical	1
(2) Food and agriculture	1
(3) Metallurgical	1
(4) Mineral	1
(5) Organic solvent usage	3

<u>Emission Source Category</u>	<u>Assumption #</u>
Combustion of fuels - area sources	
(1) Industrial	2
(2) Commercial	3
(3) Residential	3
Combustion of fuels - point sources	
(1) Steam electric power plants	4
Waste disposal by open burning - area sources	
(1) Agricultural debris	1
(2) Forest management	5
Miscellaneous area sources	
(1) Wild fires	3
(2) Structural fires	3
(3) Farming operations	1
(4) Construction/demolition	3
(5) Unpaved roads	5
(6) Other	5

Assumption #1: The Comprehensive Planning Organization (CPO) of San Diego County has made projections of employment in 22 different industrial categories which are defined as being "basic" (Tables 3-8 and 3-9). The percent change in emissions is assumed to be equal to the percentage change in employment of the individual industry from 1972 to 1985. This assumption was utilized because there does not appear to be any information available which projects industrial output and the processes in a detailed fashion. The errors involved in relating emissions to employment include not accounting for increased automation, efficiency and "cleaner" (in terms of emissions) processes.

Assumption #2: Since the emissions from this category (fuel combustion) are for all industries in the county, the percentage change in emissions is assumed equal to the percentage change in employment for all industries, which is given in the TOTAL line of Table 3-9.

Assumption #3: The change in emissions is assumed equal to the rate of growth of population in the county. This has been projected by the CPO as:

1970 - 1,357,900
+39.8% { 1972 - 1,445,851 (linear interpolation)
 1985 - 2,021,300

Table 3.8. Industrial Employment Projection Categories

<u>ID NUMBER</u>	<u>INDUSTRY</u>
1	Agriculture
2	Mineral Extraction
3	Aircraft, Ordnance, Shipbuilding, Misc.
4	Food and Kindred Products
5	Apparel
6	Lumber, Wood, Furniture, Fixtures
7	Paper and Allied Projects
8	Chemical and Allied Products
9	Misc. Non Durables
10	Stone, Clay and Glass
11	Primary and Fabricated Metals
12	Machinery, except Electrical
13	Electrical Machinery
14	Instrument and Related Products
15	Railroad Transportation
16	Trucking and Warehousing
17	Water Transportation
18	Air Trans., Pipeline, and Trans. Service
19	Wholesale Trade
20	Federal Government
21	State Government
22	Military

Source: The Comprehensive Planning Organization of San Diego

Table 3-9. Industrial Employment

<u>ID NUMBER</u>	<u>1972</u>	<u>1985</u>	<u>PERCENT CHANGE</u>
1	15,087	10,297	-31.7
2	561	711	26.7
3	28,447	33,647	18.3
4	4,091	4,291	4.9
5	3,758	5,458	45.2
6	1,438	2,088	45.2
7	211	361	71.1
8	1,104	1,504	36.2
9	714	1,314	84.0
10	1,530	2,130	39.2
11	2,026	3,476	71.6
12	5,826	12,576	115.9
13	10,845	20,995	93.6
14	801	1,751	118.6
15	278	278	0
16	2,763	4,263	54.3
17	388	588	51.4
18	2,951	4,701	59.3
19	14,217	23,217	63.3
20	32,338	43,188	33.6
21	17,985	21,885	21.7
22	71,330	74,530	4.5
TOTAL	218,689	273,249	24.9

Source: The Comprehensive Planning Organization of San Diego

Assumption #4: The San Diego County APCD has obtained fuel consumption projections from San Diego Gas and Electric (SDG&E) through 1983 and these projections have been extrapolated to 1985. SDG&E expects a decrease in natural gas availability and thus a corresponding increase in the use of fuel oil. These two factors will result in an increase in RHC, CO, NO_x and particulate emissions. By using EPA and SDG&E source test emission factors, the APCD has arrived at projected emissions from power plants.

Assumption #5: No change in emissions from 1972 to 1985 is expected in this category.

Mobile Sources

Sources reporting no particulate emissions in 1972 are expected to continue doing so through 1985. For all other sources (listed below), the following methodology was used:

<u>Emission Source Category</u>	<u>Assumption #</u>
Motor vehicles - on highway, powered by	
(1) Gasoline	6
(2) Diesel	7
Uncontrolled engines	8
Aircraft	1
Ships and Railroads	1

Assumption #6: The promulgated EPA oxidant control plan for the San Diego AQCR requires retrofitting all LDV of model years 1966-1974 capable of using gasoline of 91 RON or less with catalytic mufflers. Of these model years, 60% of the 1966-1970 model years, 75% of the 1971 model year and 95% of the 1972-1974 model years can be retrofitted. In addition, to meet the 1975 emission standards, automobile manufacturers have elected to install catalytic mufflers as standard equipment. These facts permit the projection of particulate emissions in 1985 by the following method:

- (a) The particulate emission factor for automobiles equipped with catalytic mufflers is 0.16 grams/mile while for automobiles not so equipped, it is 0.43 grams/mile. (3-8)

- (b) Based on the VMT distribution of the different model years (Table 3-10) and the knowledge of the percent of each model year equipped with catalytic mufflers, a weighted particulate emission factor in 1985 can be calculated as:

$$(.984)(0.16) + (.016)(0.43) = 0.16 \text{ gm/mi}$$

weighted per-
centage of VMT
driven by
automobiles
equipped with
catalytic
mufflers

weighted per-
centage of VMT
driven by
automobiles not
equipped with
catalytic
mufflers.

- (c) The CPO has projected the daily LDV VMT in 1985 to be 29×10^6 miles. However, due to the EPA promulgated VMT reduction measures, the CPO-predicted VMT figure has to be reduced by 11%. Thus, the daily LDV VMT in 1985 is 26×10^6 miles.
- (d) Thus, particulate emissions from automobiles is $(1.76 \times 10^{-7} \text{ tons/mile}) (26 \times 10^6 \text{ miles})$
= 4.6 tons/day.

Assumption #7: On the basis of the CPO/Cal Trans projections, (Table 3-7) a 44% increase in VMT is expected from 1972-1985. It is assumed that diesel vehicle VMT increases accordingly. This figure is assumed to mean a corresponding increase in emissions.

Assumption #8: On the basis of the Automotive Environmental Systems, Inc. projection, a 40% increase in emissions is expected from 1972-1985. (3-2)

Table 3-10. Light Duty Vehicle Assumptions

Model Year	Vehicle Distribution ¹	VMT Distribution ²	Percent of Model Year Vehicle Equipped w/Catalytic Mufflers ³	
1985	7.9%	13.5%	100	Standard Equipment
1984	9.9%	14.7%	100	
1983	9.5%	12.0%	100	
1982	9.2%	10.0%	100	
1981	8.9%	9.0%	100	
1980	8.5%	8.0%	100	
1979	8.2%	7.5%	100	
1978	7.8%	6.7%	100	
1977	6.7%	5.0%	100	
1976	5.4%	4.0%	100	
1975	4.2%	2.5%	100	Retrofitted
1974	2.9%	1.5%	95	
1973	2.2%	0.1%	95	
1972	1.7%	0.1%	95	
1971	1.5%	0.9%	75	
1970	1.4%	0.7%	60	
1969	4.4%	0.2%	60	
Sources: (1) EPA (3-7)				
(2) Rand Corp. (3-3)				
(3) Appendix G				

3.4 INVENTORY PROJECTIONS TO 1985

3.4.1 Reactive Hydrocarbons and Carbon Monoxide

Table 3-11 contains the baseline and projected inventories of reactive hydrocarbons and carbon monoxide for the San Diego air quality maintenance area. The inventories are plotted in Figures 3-1 and 3-2. On the basis of the data presented, the following conclusions may be drawn:

- The allowable emission levels for reactive hydrocarbons will not be attained by 1985 under presently scheduled control programs.
- The allowable emission level for carbon monoxide will be attained by 1977 and maintained through 1985 under the presently scheduled control program.
- If the allowable emission level for reactive hydrocarbons is to be attained by 1977 through light duty vehicle VMT reduction, a 90% reduction would be required.
- By 1985, the most significant source category for reactive hydrocarbons will be the uncontrolled engines category.

A detailed accounting of light and heavy duty vehicle emissions computations is contained in Appendix F. Since uncontrolled engines are projected to become a very significant portion of the 1985 inventory of reactive hydrocarbons, a detailed breakdown of emissions in this category are contained in Tables 3-11 and 3-12. As may be seen from Table 3-12, the effects of the anticipated EPA control program for new motorcycles will not become significant until after 1985.

3.4.2 Particulate Matter

Table 3-14 contains the present and projected inventory of particulate matter for the San Diego Air Quality Maintenance area.

- There is a slight increase in particulate emissions from 61 tons/day in 1972 to 61.2 and 64.0 tons/day in 1977 and 1985, respectively. Despite a reduction in particulate emissions from automobiles (because of catalytic mufflers), increases in power plant emissions and wild fires result in higher particulate emissions in 1977 and 1985.

Table 3-11. San Diego County Emission Inventory

<u>STATIONARY SOURCES</u>	<u>1972</u>		<u>1977</u>		<u>1980</u>		<u>1985</u>	
	<u>RHC</u>	<u>CO</u>	<u>RHC</u>	<u>CO</u>	<u>RHC</u>	<u>CO</u>	<u>RHC</u>	<u>CO</u>
<u>Organic Solvent</u>								
Surface Coating	7.6	-	1.2	-	1.4	-	1.7	-
Dry Cleaning	2.8	-	0.4	-	0.4	-	0.5	-
Degreasing	5.4	-	-	-	-	-	-	-
Pesticide	0.9	-	0.8	-	0.72	-	0.6	-
<u>Petroleum Marketing</u>								
Area Sources	18.0	-	1.8	-	2.0	-	2.3	-
Point Sources	15.2	-	1.5	-	1.7	-	2.1	-
<u>Combustion of Fuels</u>								
Industrial	0.6	1.0	0.66	1.1	0.7	1.18	0.75	1.25
Commercial	0.2	0.5	0.25	0.6	0.28	0.7	0.33	0.82
Residential	0.4	1.0	0.49	1.2	0.55	1.4	0.65	1.64
Steam Electric	0.6	1.8	1.9	2.8	2.3	3.5	1.8	2.6
<u>Waste Disposal (burning)</u>								
Agriculture	0.1	0.3	0.09	0.26	0.08	0.24	0.07	0.20
Forest	1.8	7.6	1.8	7.6	1.8	7.6	1.8	7.6
Other	-	0.1	-	0.12	-	0.14	-	0.16
<u>Miscellaneous</u>								
Wild Fires	7.0	29.5	8.1	33.9	8.7	36.6	9.8	41.3
Structural Fires	0.1	1.3	0.11	1.5	0.12	1.6	0.14	1.8
Stationary Source Total:	60.7	43.1	19.1	49.1	20.7	53.0	21.5	57.4

Table 3-11. San Diego County Emission Inventory (Continued)

	<u>1972</u>		<u>1977</u>		<u>1980</u>		<u>1985</u>	
<u>MOBILE SOURCES</u>	<u>RHC</u>	<u>CO</u>	<u>RHC</u>	<u>CO</u>	<u>RHC</u>	<u>CO</u>	<u>RHC</u>	<u>CO</u>
Diesel	0.8	4.6	0.9	5.4	1.0	5.8	1.2	6.6
Aircraft	7.1	28.1	7.7	37.0	8.1	40.9	9.5	52.3
Ships	0.1	0.1	0.12	0.12	0.13	0.13	0.15	0.15
Railroad	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Uncontrolled Engines	14.8	120.0	16.4	128.0	17.1	133.0	18.7	140.0
LDV	111.8	775.0	30.5	172.0	16.4	84.0	9.0	38.0
HDV	18.4	140.0	12.8	133.0	9.4	140.0	7.0	159.0
Mobile Source Total:	153.1	1068.0	68.5	475.6	52.2	403.9	45.7	396.2
TOTAL:	214	1111	87.6	525	72.9	457	68.2	454
Allowable emissions (tons/day)	<u>RHC</u> 53.5	<u>CO</u> 522						

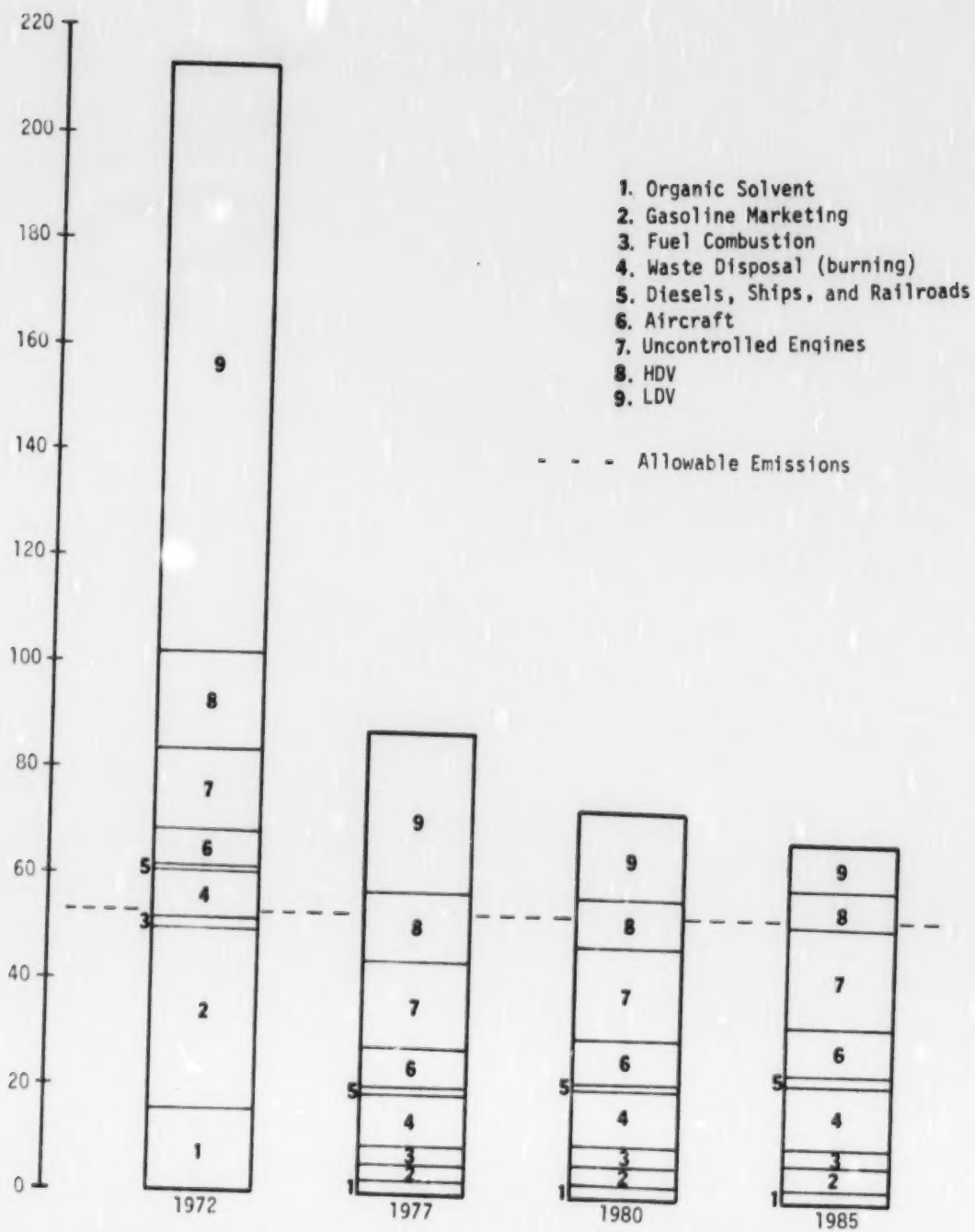


Figure 3-1. Emission Projection for Reactive Hydrocarbons

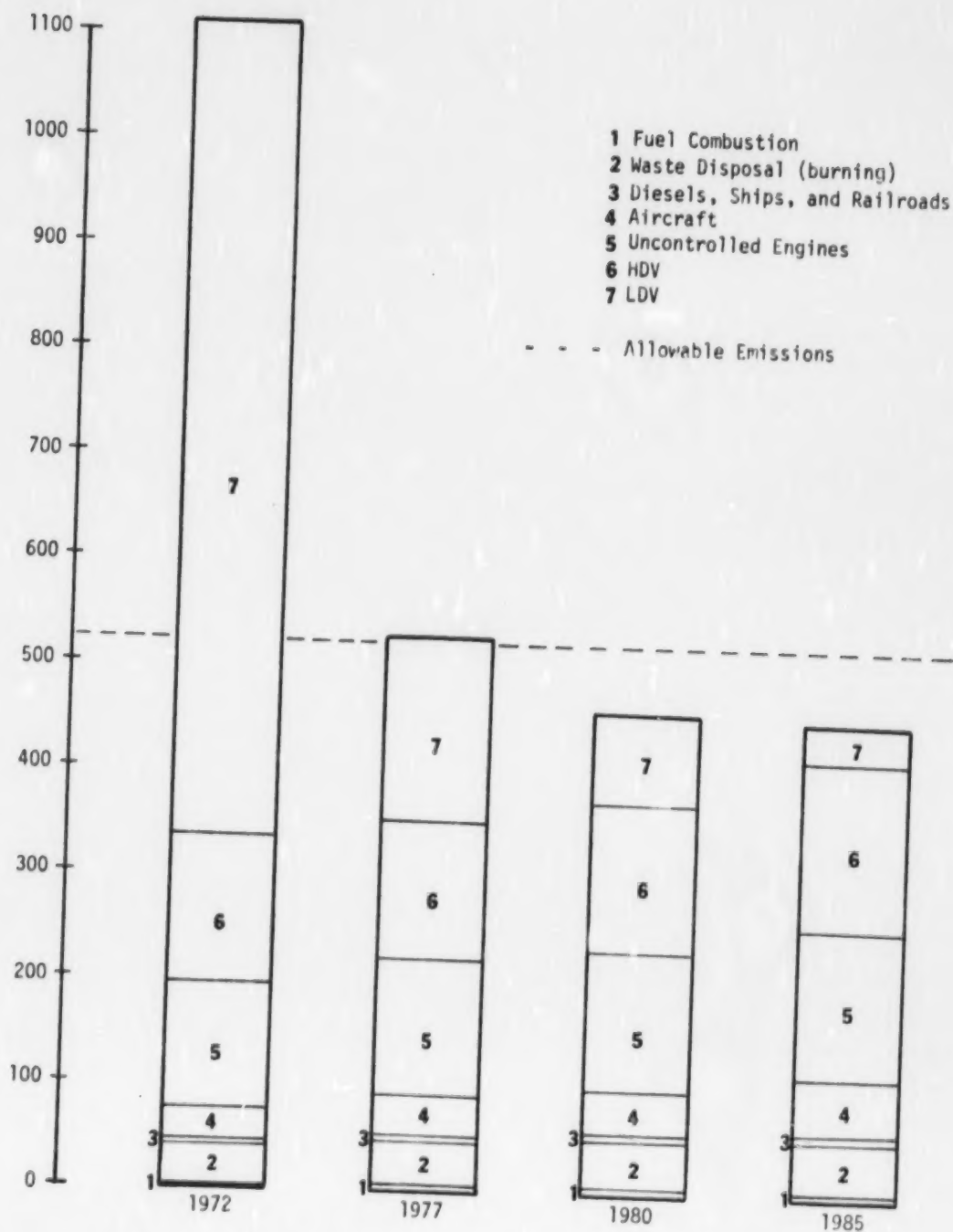


Figure 3-2. Emission Projection for Carbon Monoxide

Table 3-12. AESI Total Hydrocarbon Inventory and Projections for San Diego County

	<u>1970 THC</u>	<u>1980 Growth Factor</u>	<u>1980 THC</u>	<u>Assumed Reactivity</u>
Exempted Vehicles	4.27	0.32	1.37	80%
Competition Vehicles	.03	1.35	0.04	80%
Motorcycles	4.72	1.79	8.45	90%
Snowmobile, ATV's, Dunebuggies	.91	1.48	1.35	80%
Lawn & Garden Equipment	1.92	1.34	2.57	80%
Farm Equipment	.45	1.19	0.54	80%
Off-Road Heavy Duty	<u>3.84</u>	1.33	<u>5.11</u>	99%
Total	16.14		19.43	

Table 3-13. Reactive Hydrocarbon Emission Projections for the Uncontrolled Engines Category

	<u>RHC, Tons/Day</u>			
	<u>1972</u>	<u>1977</u>	<u>1980</u>	<u>1985</u>
Exempted Vehicles	2.95	1.79	1.10	0.90
Competition Vehicles	.02	.02	.03	.03
Motorcycles	4.92	6.60	7.61	10.65
Snowmobiles, ATV's, Dunebuggies	0.80	0.98	1.08	1.34
Lawn and Garden Equipment	1.64	1.90	2.06	2.41
Farm Equipment	0.38	0.41	0.43	0.47
Off-Road Heavy Duty	<u>4.05</u>	<u>4.68</u>	<u>5.06</u>	<u>5.89</u>
Sub-Total	14.76	16.38	17.37	21.68
Anticipated reductions due to federal motor- cycle control program.	0	0	-0.3	-3.0
Total	14.8	16.4	17.1	18.7

Table 3-14. Particulate Emissions (Tons/Day)

<u>EMISSION SOURCE CATEGORY</u>	<u>1972</u>	<u>1977</u>	<u>1985</u>
I. Stationary Sources			
A. Process losses-point sources			
(1) Chemical	0.3	0.22	0.27
(2) Food and agriculture	3.7	2.2	1.7
(3) Metallurgical	0.1	0.1	0.14
(4) Mineral	17.9	13.0	15.2
B. Combustion of fuels-area sources			
(1) Industrial	3.6	3.9	4.5
(2) Commercial	0.9	1.1	1.3
(3) Residential	1.1	1.3	1.5
C. Combustion of fuels - point sources			
(1) Steam electric power plants	5.3	10.81	10.2
D. Waste disposal by open burning-area sources			
(1) Agricultural debris	0.1	0.09	0.07
(2) Forest Management	1.5	1.5	1.5
E. Miscellaneous Area Sources			
(1) Wild fires	5.9	6.8	8.3
(2) Structural fires	0.4	0.5	0.6
(3) Farming operations	0.1	0.09	0.07
(4) Construction/demolition	0.6	0.67	0.8
(5) Unpaved roads	8.7	8.7	8.7
(6) Other	0.3	0.34	0.4
TOTAL STATIONARY SOURCES	50.5	51.3	55.3

Table 3-14. Particulate Emissions (Tons/Day) (Continued)

	<u>1972</u>	<u>1977</u>	<u>1985</u>
II. Mobile Sources			
A. Motor vehicles - on highway, powered by:			
(1) Gasoline	7.8	6.6	4.6
(2) Diesel	0.3	0.34	0.4
B. Uncontrolled Engines	1.9	2.2	2.7
C. Aircraft	.36	.45	.56
D. Ships and Railroads	0.2	0.24	0.3
TOTAL MOBILE SOURCES	10.6	9.9	8.56
TOTAL INVENTORY	61.1	61.2	63.9
ALLOWABLE EMISSIONS	27.5 tons/day		

1. Point Source Process Losses
2. Fuel Combustion
3. Miscellaneous (wild fires, constr.)
4. Gasoline Powered Motor Vehicles
5. Uncontrolled Engines
6. Aircraft
7. Diesels, Ships, and Railroads

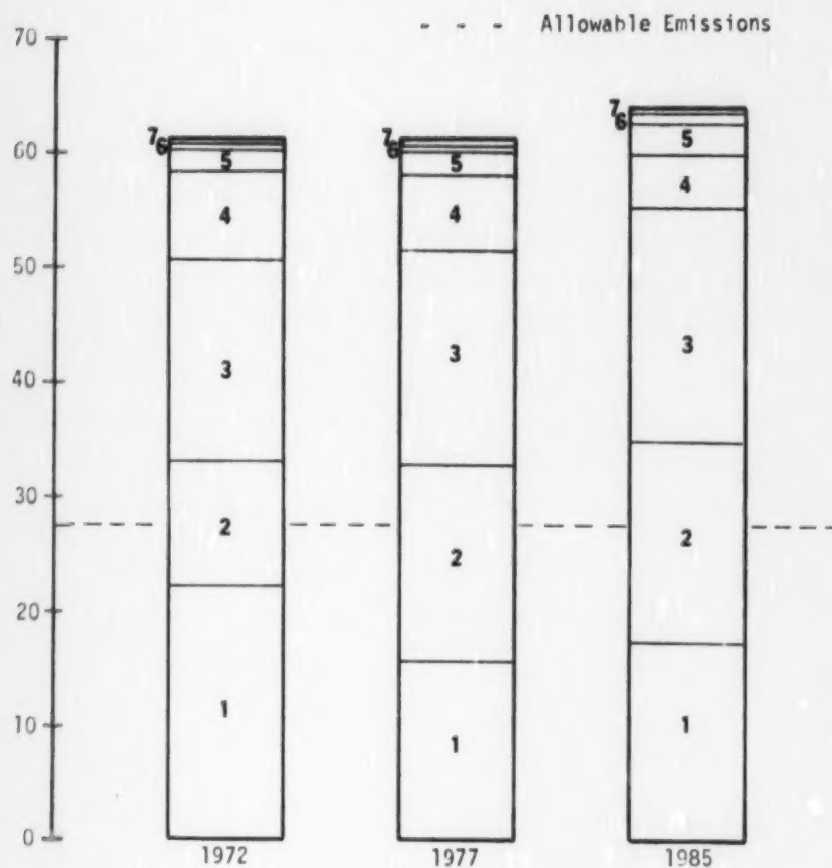


Figure 3-3. Projected Emissions of Particulate Matter

As may be seen from this inventory, further reductions in particulate matter emissions are necessary in order to meet the primary air quality standard for this pollutant. This point will be further discussed in Section 4.2.

3.4.3 Oxides of Nitrogen and Sulfur Dioxide

The air quality data analyzed in Appendix A indicate that ambient concentrations of SO_2 and NO_x are presently below the National Ambient Air Quality Standards. The California Air Resources Board projects that ambient concentrations for both pollutants should continue to be below the standards. The analysis performed for the present study confirms this result.

The data indicates that a roughly seven-fold increase in SO_2 emissions may be tolerated before the air quality standard for this pollutant is exceeded. Since SO_2 emissions are projected to increase by no more than a factor of three by 1985, even under pessimistic assumptions concerning fuel sulfur content, SO_2 is not considered to pose maintenance problems.

In the case of oxides of nitrogen, present ambient concentrations are much closer to the primary air quality standard for this pollutant. However, the federal new car control program is expected to more than offset any growth in NO_x emissions which might occur from other sources through 1985.

3.5 COMPARISON WITH THE RESULTS OF PREVIOUS STUDIES

There have been five previous studies of the San Diego oxidant problem:

- The California Air Resources Board Implementation Plan for the San Diego Air Quality Control Region. (3-9)
- A Rand Corporation study of attainment strategies for photochemical oxidants. (3-10)
- An EPA technical support document for the attainment of the oxidant air quality standard by 1977. (3-7)
- A California Air Resources Board study for the designation of air quality maintenance areas within the state. (3-11)
- A local task force study of attainment strategies for San Diego. (3-12)

This section is devoted to a comparison of the result obtained here with the results of these previous studies, and where possible to the explanation of apparent discrepancies.

3.5.1 The Rand Study

The Rand Corporation developed an attainment plan for San Diego with regard to photochemical oxidant. The Rand study concluded that the oxidant standard could be attained and maintained through 1995 without the necessity of a massive VMT reduction:

"...We estimate that the nominal strategy can achieve the oxidant standard in 1983 with no mileage reduction, but an alternative strategy ... can achieve it in 1975...."

"Significantly, once a standard has been met, it stays met through 1995. This is true for reactive hydrocarbons (oxidant) and carbon monoxide.... Since we believe the growth rates used give an upper bound on emissions, this suggests that the near-term strategies we have presented should meet the National Primary Air Quality Standards in 1995 regardless of which transportation/land-use concept San Diego ultimately adopts."

The "nominal strategy" referred to above consists only of the presently mandated local, state and federal controls, excluding the EPA promulgated plan for attainment of the oxidant standard by 1977. The alternative strategies consist of strict organic solvent use controls, an

inspection/maintenance program, oxidizing catalyst retrofit of 1955-74 light duty vehicles, stringent aircraft emission control measures (80% reduction), additional evaporative control retrofit of 1955-69 light duty vehicles, and a mileage surcharge measure to produce a nominal (4.3%) VMT reduction.

The reasons for the apparent discrepancy between the Rand result and the result obtained here may be summarized as follows:

- The Rand study used 1970 as the base year, with a maximum oxidant of 0.31 ppm predicted by a Larsen analysis of the monitoring data.

Since the present study is based on a 1972 baseyear with an essentially equivalent maximum oxidant measurement (0.32 ppm), the allowable emissions are reduced from 61.5 tons/day to 53.5 tons/day.

- The Rand inventory did not include emissions from uncontrolled engines (with the exception of motor-cycles) as well as from wild fires and structural fires.

The addition of sources to an inventory over which no control is anticipated increases the burden of control in other areas.

- The oxidizing catalyst retrofit recommended by Rand will not be completely implemented by EPA under its final promulgation.

Rand assumed that all light duty vehicles of model year 1955-74 could and would be retrofitted with oxidizing catalysts. The EPA regulation applied only to those cars which could run on 91 RON gasoline. In addition, the EPA regulation applied only to 1966-74 light duty vehicles.

- Rand assumed an 80% reduction of aircraft emissions was possible, largely based on the modification of ground operating procedures at airports.

EPA could not include ground operating procedure modifications in its final promulgation, since discussions with the Federal Aviation Administration were still in progress. No agreement has been obtained to date with regard to the feasibility of such a control measure.

3.5.2 The California Air Resources Board Implementation Plan

The latest proposed revision to the State of California Air Resources Board implementation plan for the San Diego Air Basin indicated that attainment of the oxidant standard would occur by 1980. The ARB plan is based on a maximum oxidant measurement of .40 ppm in 1970. The resulting allowable emissions level under this combination was 43 tons per day, compared to the 53.5 tons allowed here. The ARB's result was based on a 95% reduction in aircraft and ship emissions in addition to proposing an oxidizing catalyst retrofit for 1966-74 light duty vehicles and 1962-74 heavy duty vehicles. Other elements of the ARB proposal are an inspection/maintenance program for light duty vehicles, gasoline marketing controls, and a 20% VMT reduction due to unspecified measures. Unfortunately, the ARB neglected wild fires and uncontrolled engines in their inventory.

3.5.3 The EPA Promulgated Plan for Oxidant Control

The EPA plan for San Diego has been previously described in Section 3.2. The difference between the projected inventory published in the Federal Register and the projection developed for this study is due to two main factors:

- EPA neglected emissions due to uncontrolled engines (with the exception of motorcycles), wild fires, and other burning.
- EPA claimed roughly a 74% reduction in motorcycle emissions, presumably as a result of the proposed motorcycle ban.

The regulation concerning motorcycles is written in an "either/or" fashion. It states that the motorcycle ban will not go into effect if EPA promulgates regulations for new motorcycles, as described previously.

It is felt that the probability of EPA regulating emissions from new motorcycles is much higher than the probability of EPA banning the use of two-stroke motorcycles during daylight hours of the smog season. Unfortunately, stringent standards are not anticipated to apply to new motorcycles until 1979.

3.5.4 The Local Agency Task Force Plan for Attainment

The ad hoc San Diego Air Pollution Control Task Force was established in response to the proposed EPA transportation control plan for the San Diego Air Basin (issued on August 15, 1973). The task force consisted of representatives from the City and County governments, the Comprehensive Planning Organization, the California Department of Transportation, the San Diego Transit Corporation, and the San Diego Unified Port District.

The goal of the task force was to provide alternatives to the EPA-proposed transportation control measures. The preliminary study results indicated that a modest 10 percent reduction in daily vehicle miles traveled in addition to previously proposed technological controls was necessary to meet the oxidant standard by 1977. The study further indicated that such a VMT reduction could be accomplished through measures such as improving the road system, improving bus service, instituting a 4-day work week, and applying various tax incentives and dis-incentive measures to discourage auto use and encourage car pooling and bus riding.

Unfortunately, according to preliminary documentation, this study used 1970 as its base year, and assumed that EPA would be controlling emissions from aircraft and ships in a fashion commensurate with reductions anticipated for motor vehicles. Also, emissions from uncontrolled engines were apparently neglected.

3.5.5 The California Air Resources Board Maintenance Area Designation Study

The ARB, in their analysis of potential air quality maintenance areas, has identified San Diego as having maintenance problems with regard to oxidant, carbon monoxide, and particulate matter. The present study is in agreement with this conclusion for oxidant and particulate matter; however, three differences must be noted.

First, the ARB used growth factors for certain industrial categories which were based on the Bureau of Economic Analysis (U.S. Department of Commerce) projections as presented in "Population and Economic Activity in the United States and Standard Metropolitan Statistical Areas, Historical

and Projected 1950-2020," (July 1972). These Department of Commerce projections were based on the DOC Series C population projections which are significantly lower than either the California Department of Finance Series D-100 projections or the local CPO population projections used for this study (see Appendix B). Interestingly, the ARB used the Department of Finance D-100 projections for those source categories that were considered more closely related to population. Further, in using the Department of Commerce projections, the ARB used "earnings indices" of the various industrial categories as the measure of growth in emissions. These indices result in significantly higher future year emissions than the technique employed in the present study.

Second, in the case of particulate matter, the ARB used a 1971 annual average concentration of $88.7 \mu\text{g}/\text{M}^3$ to compute the allowable emission limit, while in 1972 an annual average of $97 \mu\text{g}/\text{M}^3$ was recorded. The allowable emission level used in the present study is therefore lower than that used by the ARB.

In the case of carbon monoxide, the projections previously presented indicate that the CO standard will be attained by 1977 under the present EPA control plan, and subsequently maintained through 1985.

3.6 ANTICIPATED FUEL SHORTAGE IMPACTS

In light of the recent shortages of petroleum-based fuels, an obvious question is: What would be the impact of a fuel shortage on the emission projections made and how would this affect the control requirements?

According to Federal Energy Office fuel allocation procedures (3-13), private automobiles and commercial airlines would receive lowest priority. The total RHC emissions from LDV, aircraft and gasoline marketing in 1985 are 18.5 tons/day. From Table 3-11, we note that a further reduction of 14.7 tons/day of reactive hydrocarbons is required to attain the standard in 1985. Thus, in order for a fuel shortage to obviate the need for additional controls, the shortage must be of such a magnitude that 80% of both automobile and commercial aircraft activity is stopped. Although FEO procedures are not quite accurately reflected in this example, the conclusion

of a more detailed analysis would not be substantially different from that arrived at here. No reasonable projection of possible fuel shortages will result in the elimination of the need for additional control measures to achieve the oxidant standard in San Diego by 1985.

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- 3-3 Mikolowsky, W. T., "The Motor Vehicle Emission and Cost Model (MOVEC): Model Description and Illustrative Applications", The Rand Corporation, December 1973.
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- 3-7 Environmental Protection Agency, Technical Support Document for the San Diego Intrastate Air Quality Control Region, July 31, 1973.
- 3-8 "The Development of a Particulate Implementation Plan for the Los Angeles Region, Report #2-Emission Inventories and Projections", Preliminary Draft, TRW, Inc., June 1974.
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- 3-11 State of California Air Resources Board, "Identification of Air Quality Maintenance Areas", Staff Report, June 13, 1974.
- 3-12 San Diego Air Pollution Control Task Force, "Cleaning Up the Air - Local Transportation Control Plan for the San Diego Air Basin", Preliminary Draft, October 5, 1973.
- 3-13 The Federal Register, Vol. 39, No. 10, "Petroleum Allocation and Price Regulations," January 15, 1974, page 1924.

4.0 ATTAINMENT STRATEGIES

The emission inventory projections presented in Section 3 indicate that the National Ambient Air Quality Standards for oxidant and particulate matter will not be achieved under present control programs. This section is devoted to a discussion of additional strategies required to achieve the standards within the 1977-1985 time frame.

4.1 REACTIVE HYDROCARBON REDUCTION MEASURES

In the years subsequent to the implementation of the EPA hydrocarbon control program, the major source categories will be wild fires and forest waste disposal, jet aircraft, uncontrolled engines, and light- and heavy-duty gasoline powered motor vehicles. Together, these sources account for 86% of the total reactive hydrocarbon emissions in 1977, and 78% by 1985.

In order to attain the standards by 1977, 100% LDV VMT reduction would be required. Alternatively, a strategy geared toward attainment of the air quality standard within the 1980-85 time period should consist of the following elements:

- Heavy duty vehicle inspection/maintenance, oxidizing catalyst retrofit, and new vehicle emission standards comparable to light duty vehicle emission standards.
- Motorcycle retrofit control program requiring a minimum 50% reduction in emissions from pre '79 motorcycles.
- Aircraft control program including modification of ground operating procedures, which also applies to the military component of the aircraft activity in the County. A 60% reduction in emissions due to such a program is not an unreasonable expectation.

The 1970 Clean Air Act required that within five years, a 90% reduction in emissions of hydrocarbons, carbon monoxide, and oxides of nitrogen from automobiles should be accomplished. The technology for accomplishing

this task was not developed at that time, and today it appears that the standards for hydrocarbons and carbon monoxide will be achieved, albeit within six years instead of five. With this example in mind, anticipating a reduction of 60% from previously uncontrolled sources over a period of 5 to 10 years is not an unreasonable expectation, provided that the appropriate standard-setting procedures are initiated soon.

The State Air Resources Board as of April 23, 1973, has proposed revision to the State Implementation Plan which includes the retrofit of 1962-74 model year heavy-duty vehicles with oxidizing catalysts.

Such a control measure is a logical "next step" in a situation where maximum LDV controls are insufficient for attainment of the standards. It is also prudent to gain experience in the application of such controls before extending them to additional vehicle populations. Heavy duty vehicle controls should therefore be a principal element in a strategy to meet the standards by the 1980-85 period.

In the case of motorcycles, new "clean" motorcycles will have begun to enter the market during the 1980-85 time frame. Depending on the actual target year decided upon for attainment, retrofit program for older motorcycles could result in significant reductions from these sources. Since the technology is not currently available for accomplishing such reductions, no precise estimate of the control potential may be made.

Aircraft controls hinge on cooperation between EPA, the Federal Aviation Administration, and the military. Assuming that such cooperation is obtained within the next few years, appropriate ground operating procedures should be in effect by 1980. In addition, further control of jet exhaust emissions should be feasible within the 1980-85 time frame.

To summarize, a 60% reduction from motorcycles, heavy duty vehicles, and jet aircraft would provide for attainment of the allowable emissions by 1985. (Attainment by 1980 would require an 80% reduction from the same source categories.) Under such a control program, light duty vehicles

again become the largest single source category, accounting for almost 20% of the total inventory in 1985. Under the Controlled Trends alternative, VMT is projected to increase by almost 30% within the 1985-1995 time period, while the effect of the federal new car control program is expected to become insignificant beyond 1985. Assuming that such reductions do occur, the proper time frame for consideration of maintenance measures should be the 1985-1995 period rather than the 1975-1985 period originally conceived.

4.2 PARTICULATE MATTER

In order to assess achievement and later maintenance of the federal secondary standard for suspended particulate matter (60 micrograms per cubic meter), a discussion of the current monitoring stations and probable sources of the particulate loading is necessary. The problem is more complex than is the case with other air pollutants since particulates cover a wide range of compounds from a wide variety of sources. In addition, some of the mass of particulates may be formed in the atmosphere from reactive gases, while another portion consists of "dust" and "smoke" or relatively inert matter from both industrial and natural sources. Perhaps more than other air pollutants, particulate concentrations vary considerably in an urban area, depending on the proximity of sampling to local emission sources. Despite the uncertainties involved, an attempt to account for the particulate loading in San Diego is made below.

The two APCD stations which monitored for suspended particulates during 1972 reported 79 and 97 $\mu\text{g}/\text{m}^3$ at downtown San Diego and El Cajon, respectively. The downtown station is about 35 feet from ground level, while at El Cajon it is only 14 feet. Although the downtown station is in a heavily travelled business district, major freeways are to the east and downwind of the sampling site. At El Cajon, however, a major freeway runs both to the north and west of the station. Lead concentration was observed to be often twice as high at El Cajon as downtown during 1972, further suggesting a significant automotive

contribution to the loading at El Cajon. The height difference makes it difficult to assess possible local traffic contributions, although the El Cajon station is 150 feet from the nearest street. Both stations tend to have higher values in the winter quarter than in summer, suggesting a non-photochemical nature to the particulate mass.

A line source diffusion model (see Appendix H) was applied to the freeway (Interstate 8) near El Cajon to estimate the maximum potential magnitude of particulates from this source which might be expected at the monitoring station, roughly 800 meters downwind. Assuming 100,000 vehicles per day, 2 meter/sec wind speed, and 0.43 grams of particulates per mile per car, about 40 micrograms per cubic meter resulted.

Since a heavy concentration of mineral industries occurs in Mission Valley (generally upwind of El Cajon), a point source diffusion model was applied to the approximately 9.5 tons per day industrial and mineral emissions in this area. The distance between El Cajon and the sources would tend to minimize the error due to the non-point nature of the emissions. A 20 kilometer distance to El Cajon was assumed and again, 2 meter/sec wind speed. A contribution of about 20 micrograms per cubic meter resulted from this calculation.

Using $30 \mu\text{g}/\text{M}^3$ as a background (ARB), $90 \mu\text{g}/\text{M}^3$ is the expected concentration at El Cajon. These calculations are somewhat low compared to the observed concentration of $97 \mu\text{g}/\text{M}^3$, but the potential magnitude of the sources is illustrated.

Emissions of particulates from industrial sources were to be reduced by 33 percent by January 1, 1974, according to San Diego APCD regulations.* Control of automotive emissions of particulate matter are expected to decrease by about 15% by 1977. The 1972 emission inventory shows 61 tons per day total suspended particulates. Sixty-one tons/day and 64 tons/day are expected in 1977 and 1985 respectively, illustrating that no overall reduction is projected through 1985. The

*Rule 52, San Diego APCD.

crudeness of the calculations reflects the lack of knowledge about the problem but shows that further controls than are currently planned will be necessary in order for air quality standards to be met. With additional monitoring closer to major sources, the spatial uncertainty of source contributions might be resolvable. Additionally, composition data at El Cajon, such as sulfate, nitrate, organics, and perhaps calcium, would provide a more reliable identification of the sources of the particulates.

To summarize, the plume computations indicate that neither industrial nor motor vehicle emissions may be neglected as possible sources of the high particulate loading at El Cajon. In the absence of additional data, it is not possible to define the proper control strategy to meet the standard at this location. However, controls are scheduled to go into effect in both of the aforementioned categories which should reduce their particulate emissions significantly.

If additional data confirms the estimates presented here, a promising additional control which should dramatically reduce automobile exhaust particulate emissions is the removal of sulfur from gasoline. By 1977 essentially all of the exhaust particulates from autos will consist of sulfuric acid mist due to the anticipated use of oxidizing catalytic converters. The removal of sulfur from gasoline should therefore produce an almost total removal of particulate emissions from auto exhaust. In addition, it has been estimated that the cost of removing sulfur from gasoline would be roughly 1.5 cents per gallon, with a required lead time of roughly three years.*

*Statements of Sun Oil Company and Shell Oil Company presented at Hearings before the Committee on Public Works, United States Senate, "Compliance with Title II (Auto Emission Standards) of the Clean Air Act," November 5 and 6, 1973, serial number 93-H23.

5.0 POTENTIAL MEASURES FOR THE MAINTENANCE OF AIR QUALITY

The central problem of air quality maintenance planning is how can pollutant emission levels be maintained (such that air quality standards are not violated) in the face of continuing urban growth? Technological solutions for reducing emissions constitute one alternative; however, such solutions cannot be relied upon to ensure maintenance in the long term. In all probability, the set of currently known technological solutions will be exhausted by 1985, since these solutions will have been either executed or no longer timely. Other alternatives which are geared toward minimizing emissions by controlling the manner in which the growth occurs must be considered in the development of an air quality maintenance plan. Indeed, it is imperative that a series of maintenance strategies be instituted as soon as possible in order to realize maximum effectiveness by the 1985-1995 time frame. This section is devoted to a description of some of these measures as well as the context in which they might be applied.

5.1 STATE LEVEL LAND USE CONTROL MEASURES

Environmental Impact Statement (California Environmental Quality Act)

The procedures for environmental impact reporting, as set forth by the California Environmental Quality Act (1970) require that an impact statement be prepared for all state initiated activities and all private actions that are sanctioned by local governmental police power authorities, e.g., issuance of a subdivision permit to a private developer. CEQA, however, does not provide veto power over any decision to proceed with a project, even if adverse effects on the environment are incurred.

Recreational Land Regulation

Recreational land represents a land use category for which regulations similar to residential zoning ordinances might be warranted in order to ensure development that conforms with air quality standards (or other community goals and objectives).

Taxation Policy to Preserve Non-Developed Areas

The concept of taxation policy for shaping future growth has typically been manifested in two methods:

- (1) Capital gains tax on land development where the tax rate is inversely related to the duration of the land holding.
- (2) Taxation of agricultural or undeveloped land based on its use, rather than on market value; in addition, the difference between the tax on use and the tax on the market value could be deferred until the time of development.

Both of the policies are designed to exert some braking effect on rapid development, which, in turn has an indirect effect on air quality maintenance. They are, in effect, incentives for low-intensity land use. The California Williamson Act was enacted in 1965 for this purpose but its effectiveness has been mitigated by the absence of requirements to relate lands eligible for special tax rates to a regional land-use plan.

Emissions Allocation Procedures

Emissions allocation is a maintenance measure that requires that emissions of pollutants be limited to prescribed levels within an airshed, air basin, AQMA, or portion thereof. Implementation of an emission allocation procedure would require: (1) a detailed inventory of air pollution emissions in planning sub areas of an AQMA or air basin, (2) a designation of maximum allowable emissions in each sub area to achieve and maintain air quality, (3) an estimation of future sub area emissions as indicated in (regional) land-use and transportation plans, (4) a land-use and transportation plan that would not exceed prescribed limits, (5) adoption of measures to meet air quality standards, based on above findings, and (6) usage of environmental impact reporting to determine emissions of proposed developments.

A bill has been proposed in the California Legislature (SB 1543-rejectedly) which would mandate the application of this procedure in the 11 air basins of California and vest primary responsibility for allocating emissions levels in basinwide coordinating councils (BCCs). A major weakness of emissions allocations procedures as conceived in this bill is the inadequate state-of-the-art technology to relate a given spatial emissions pattern to the oxidant levels resulting from such a distribution. (i.e., it cannot be demonstrated at the present time that one pattern results in cleaner air than another pattern with the same total emissions.)

A-95 Review Process

An A-95 review agency has been established on a regional basis for the purpose of ensuring the coordination of Federal programs and projects with State, regional and local problems. It is designed to provide a structure for interjurisdictional cooperation in the reviewing of local planning decisions for compliance with regional plans.

5.2 REGIONAL LEVEL LAND USE CONTROL MEASURES

Direct Source Review

Direct source review procedures (like those in effect) are designed to monitor the addition and/or modification of stationary sources which may contribute significant amounts of pollutant emissions into the region. These are typically administered through a permit system.

Emission Density Zoning

This measure requires that emissions of a pollutant be limited to prescribed levels within a spatial area (e.g. pounds per acre per year of particulates) and may be applied to existing and new sources. One of the purposes is to ensure that hot spots, or high concentrations of pollutant emissions in a small area be avoided.

Open Space Planning

Open space plans are generally included as part of the general plan and are designed to provide esthetic quality and balanced land use to the region. The identification of open space areas may be one means for dispersing the effects of air pollution by providing buffer zones. Buffer areas could also be used as a means to limit development around heavy polluters, thereby reducing exposure to pollutants. The implementation of an open space plan would involve land purchases to maintain the open space nature of the area.

Regional Water Quality Control Board (Permit Review)

The Regional Water Quality Control Board is empowered with a permit review system for emitters of discharge of wastewater into navigable waters for industrial and municipal point sources. In certain circumstances the permit requirements can influence the activity which generates

the waste loading, e.g., permit review of such activities as industrial discharge may affect the locational decision of industrial siting.

"3-C" Review Process

The term, "3-C" process, comes from the wording of the Federal Aid Highway Act of 1962, which requires that all programs for Federal Aid Highway Projects approved after July 1, 1965 in urban areas of more than 50,000 population must be based on a continuing comprehensive transportation planning process carried on cooperatively in the state and local communities. As part of the planning process for these transportation projects, which represent potential line sources of air pollution, an evaluation must be made of their effects on air quality. Specifically, Section 109j of the Federal Highway Act of 1970 requires that transportation plans and highway projects conform with the State Air Quality Implementation Plan.

San Diego Coast Regional Commission (General Plan)

The San Diego Coast Regional Commission is empowered to develop a management program for the land and water resources of the coastal zone. Any applicant for a Federal license, assistance or permit to conduct an activity in coastal areas under their jurisdiction must be certified that the project is consistent with the final, approved coastal management plan. (the Commission's plan is scheduled to be submitted to the California Legislature in 1976).

5.3 LOCAL LEVEL LAND USE CONTROL MEASURES

Capital Facility Ordinances

Capital facility ordinances may be formulated to require that public facilities (e.g. public transportation, sewer and water service, police facilities) be adequate to support and service a proposed development. Such facilities must be either existing (or programmed for construction) before development can be approved, or the private developer must bear the costs of some or all of the capital facilities. These ordinances are designed to help the planning agency to channel growth to areas where it can be absorbed.

General Plan

General plans are developed by local planning groups to guide and direct the future growth patterns of the region. Typically the plans state "goals or conceptions" of directions to be followed in planning, with no associated enforcement provisions to ensure attainment of the plan objectives.

Zoning Ordinances (Existing)

Conventional zoning ordinances cover such aspects of land use as height and bulk of buildings, lot area, open space requirements, population and building density, use of buildings and land for trade, industry, residence or other purposes. Taken collectively, zoning regulations can significantly affect long term air quality.

Planned Unit Development (PUD)

Planned unit developments represent communities where multi-income residential and commercial land uses are combined in a balanced, integrated fashion. Large scale PUD's can be used as a strategy for improving air quality by offering a relatively compact, balanced configuration of residential, retail and commercial structures and thus reduce the need for auto travel.

Capital Improvements Programming

Capital improvements programming is the planned, scheduling of construction or improvements of capital facilities such as sewers, water treatment, schools and roads. Taken in conjunction with the aforementioned capital facility ordinances dealing with land capability, this can influence the direction and extent of future development and growth.

Indirect Source Review

Indirect source review is directed toward those sources that cause air pollution simply by stimulating auto traffic and therefore auto emissions, e.g., shopping centers, airports, and highways. EPA regulations, slated to be effective January 1, 1975, will enable regional or local agencies to perform the review and grant or deny permits to new indirect sources on a case by case basis. This control measure is unquestionably a far-reaching and potentially the most effective tool for enforcement of

land-use control measures. Although it is presently geared toward prevention of localized carbon monoxide violations, it can be related to a regional oxidant strategy through the requirement of compatibility with control strategies and air quality standards achievement.

Protection of Critical Environmental Areas

Plans identifying and regulating activities in environmentally sensitive areas have been adopted in order to prevent incompatible development. While air quality has not been considered as a justification for defining a critical environmental area, it could be a new application in cases where large areas are concerned.

Development Timing Controls

This measure in various forms has been applied successfully in Ramapo, New York, and conversely ruled as infringing on the constitutional right to travel in Petaluma, California. In effect, it attempts to curb rapid development by prescribing an annual quota or permit system for development that is in conformance with such determinants as capacity of public facilities to service the developments.

5.4 THE LAND-USE PLANNING CONTEXT

While land use policies are recognized to have tremendous impacts on air quality, other variables such as public response, the state of the economy, energy crisis, and political forces impact on the ultimate results of any land use planning policy, thus making it difficult to define a cause and effect relationship between the two. Since it is not possible to determine the precise contribution of land use controls to emissions reductions, the effectiveness of land use control measures will be evaluated in terms of their abilities to:

- reduce the need for auto travel, i.e., to reduce total vehicle miles of travel
- limit the rate of urbanization of rural and agricultural lands
- encourage balanced sitings of emission sources.

Land use strategies might be utilized to decrease the amount of auto travel by locating employment centers close to economically balanced

residential areas in order to reduce home to work trip times, locating commercial and service facilities in a central, localized fashion to minimize the amount of shopping and other non-work trips, encouraging a sufficient level of population density to support an operational mass transit system, or restricting auto-related services and conveniences, e.g. free parking facilities. Some pertinent land use strategies for achieving the above items are (1) zoning regulations for population and development densities, building and land use, (2) parking management policies and (3) special zoning for planned unit developments.

Limiting the rate of urbanization (the conversion of agricultural land to urban land) serves to maintain desirable ambient air quality levels in undeveloped areas and prevents the kind of low-density, urban sprawl that leads to auto dependency.

Land use strategies for air quality maintenance will serve to induce future developments in environmentally desirable areas while channeling growth away from lands which are marginal, in terms of air quality, i.e., open space area, agricultural areas or "saturated" areas that may exceed standards with the additional growth. Examples are open space plans and capital facilities programming.

Regulation of siting of major developments (residential and industrial) serves to control the direction and extent of urbanization as well as controlling potential indirect sources of increased auto traffic, e.g. shopping centers. In addition, balanced siting can have the effect of minimizing the occurrence of local air pollution "hot spots" and reducing exposure to air pollutants. Such measures as zoning ordinances regulating land usage may be utilized for this purpose.

Regional Approach

Land use controls for air quality maintenance must be viewed in a regional context for a number of reasons:

- the Clean Air Act requires the submission of state implementation plans on a regional basis
- the indirect land use controls are more effective if implemented on a large scale; localized efforts might cause adverse impacts on air quality for neighboring localities

- air pollution is a basin-wide problem that cannot be effectively addressed by local communities acting autonomously.

A logical framework for investigating the future of the air pollution problem in the San Diego Region is the Regional Comprehensive Plan for projected years 1975-1995, that is being developed by the San Diego Comprehensive Planning Organization. Based on what is called the Planned Development Policies, the Regional Comprehensive Plan is derived from an earlier conceived alternative plan -- the Controlled Trends Plan. The Controlled Trends Plan emphasizes new development in existing urbanized areas and balanced community concepts that encourage reduced home to work auto trips.

The policy statements for the Regional Comprehensive Plan and their air quality implications are described below:

POLICY I The Regional Comprehensive Plan and local plans and programs should be directed specifically toward development and enhancement of existing urban communities and the maintenance and enhancement of rural communities within the region.

Policy I's emphasis on limiting future growth, as much as possible, to existing urbanized areas serves to preserve the ambient air quality levels of rural communities. A corollary of this policy is the encouragement of higher density residential development in the existing urban areas. Another aspect of Policy I is the requirement that new growth should occur in a balanced fashion, making maximum usage of existing public services and taking advantage of employment opportunities in the urban areas. One result of Policy I is the encouragement of more cohesive, integral communities where employment opportunities, commercial, educational, cultural, recreational and health services are located in a more concentrated fashion and therefore facilitate the operation of a viable local mass transit service. Traditionally, low density residential developments and fragmentation of services and shopping areas have made successful transit service extremely difficult to achieve.

The air quality implications of this policy can only be predicted in terms of the ability of a balanced, medium to high density community to support a mass transit system and the extent to which trips by auto are replaced by trips by transit.

POLICY II New employment opportunities should be located in employment centers developed as an integral part of both existing communities and newly developing suburban communities. The size and number of the employment centers would depend on the size and character of the community within which they are located; the types of employment in each community employment center should be consistent with the availability and price range of housing in the surrounding community.

This policy directs that employment opportunities and public services be consistent with the character of existing urban and rural communities. Community-scaled employment centers will be encouraged and are to be accessible by regional and local transit services. Major employment centers should also be accessible by the regional transit system described in CPO's transportation plan (below), as well as at least one of the region's major highways. Population-serving employment operations are to be encouraged to locate as close as possible to the population served; and industrial and agricultural processing operations should be sited as close to the resource production sites as possible.

The items in Policy II serve to maximize the opportunity to decrease the length and number of trips by autos and trucks for work and for the transport of goods. The policy's impact on air quality will be determined by the success of the regional and local transit systems to serve the travel needs of the working segment of the region's population and thus to reduce the amount of auto travel which accounts for a major portion of the air pollution.

POLICY III Those activities which require Regional market or service areas should concentrate in employment and service centers. These centers should be located at the focal points of the Regional Transportation System.

Under this policy, the nature of new industrial growth should be keyed to major employers already located at the sites. Thus, employment growth in Centre City San Diego will be comprised of business and governmental headquarters activities and retail commercial activities that serve Centre City residents and visitors. Industries that are located on the San Diego Bay front should be limited to those requiring waterfront sites and accessibility to Port facilities; siting of new industrial

and employment centers should be based upon the regional transportation system network.

The relevant item in Policy III for air quality is the possibility that extensive inter-city regional traffic might arise; in addition, major employment concentrations may lead to traffic congestion (a situation leading to undesirable auto pollution levels) or to the occurrence of "hot spots."

POLICY IV Local jurisdictions should use the location of regional transit facilities as a focal point for local development plans for activities providing employment opportunities and for higher density residential development.

By keying development to transit development, this policy serves to encourage utilization of transit and thereby reduce dependency on the auto mode.

Transportation Policies for the Regional Comprehensive Plan

As part of the regional comprehensive plan, CPO has adopted a set of policies to define the transportation goals of the region and to describe the elements of a regional transit system. These policies are summarized below:

- to emphasize consistency and coordination of overall regional growth and development policies with regional and local transit services
- to recognize the importance of multi-modal systems to serve the different travel requirements of the population
- to recommend a transportation plan that will minimize the region's energy requirements and maximize improvements in the air quality
- to provide transit services to low-mobility population segments, e.g., the elderly, the young
- to maximize opportunities for pedestrian and local feeder access to regional transit terminals and stations
- to make maximum advantage of the most advanced and proven automation equipment available,

- to recommend that the regional transit system be an intermediate capacity, fixed guideway, transit network that operates on exclusive right-of-way, e.g., light rail, advanced technology transit
- to recommend an express bus network that provides high levels of transit services in medium level demand travel corridors.

The air quality implications of the regional transportation plan is again a function of the ability of the recommended transit systems to satisfy the travel requirements of the region and thus reduce the need for travel by auto along the corridors they service.

Regional Comprehensive Plan and the AQMP

It is seen that the general objectives of the Regional Comprehensive Plan, as outlined by the four policy statements, are consistent with the criteria for suitability of land use measures for air quality maintenance, i.e., to reduce auto travel, to control the areal spread of urbanization and to encourage balanced communities. Many of the land use control strategies that would be required to implement elements of the Regional Comprehensive Plan are precisely the strategies that are contemplated for inclusion in the air quality maintenance plan (AQMP).

Table 5-1 shows a list of candidate AQMP land use control measures and their potential applications for implementing each of the four policies above. For example, capital facility ordinances which would require that adequate public facilities exist or be programmed for construction within a defined time period before a subdivision plan can be granted, would serve to maintain areas designated by the regional plan to be rural. Capital facility ordinances in conjunction with a capital improvements program could be utilized to channel growth into existing urbanized areas as designated by the regional plan.

Zoning ordinances for development intensity might be formulated to encourage higher population and building density levels in designated urban areas while restricting densities in rural areas. Ordinances may also be formulated to restrict intense development in areas that are not served by proposed regional rapid transit, feeder transit, or by local transit services.

Table 5-1 Land Use Control Measures for Regional Land-Use Planning and Air Quality Maintenance

Candidate AQMD Land-Use Control Measures	Regional Comprehensive Plan Policies			
	I Enhance Existing Urban Areas/Maintain Rural Communities	II Employment Centers to be an Integral Part of the Communities	III Functional Location of Regional Market Industries	Local Development Keyed to Regional Transit Facilities
Emission Allocation*	0			•
Open Space Planning	•			
Stationary Source Review	0	0	0	
Emission Density Zoning*				
Subdivision Regulations	•			
Capital Facility Ordinances	•			
Development Timing Controls	•			
Moratoria on Building, Sewer and Water Connections	•			•
Transferable Development Rights*	•			
Taxation Policy	•			•
Capital Improvements Programming	•			•
Critical Environmental Areas	•			•
A-95 Review Process	•			•
Zoning Ordinances for:				
Development Intensity	•	•		•
Parking Requirements	•	•		•
Planned Unit Development	•	•		•
Type of Development	•	•	•	•
Indirect Source Review*	0	0	0	0

*Indicates measures that currently do not exist

Legend: • Potential application

0 Potential application if violation of air quality can be demonstrated

The four measures, emission allocation, stationary source review, emission density zoning and indirect source review are actually indirect land-use measures. To the extent that the sources which they regulate contribute to the violation of air quality standards, these measures can effect siting decisions. Criteria for issuing permits cannot be based on the grounds of violation of the regional comprehensive plan because the plan is not legally binding on anyone. Therefore, the effectiveness of these four measures in implementing a regional comprehensive plan is severely hampered.

If the approved AQMP will be legally enforceable while the Regional Comprehensive Plan is not it is preferable that the consequences of implementing the AQMP land use measures do not conflict with the regional goals for growth and development.

In addition, since air quality is only one of many factors that must be considered in regional growth and development patterns, the Comprehensive Plan is currently the only vehicle for developing and expressing overall regional goals. Therefore, to the extent that the Regional Comprehensive Plan conforms with the requirements of State or Federal air quality standards, its land use policy elements can serve as the basis for the definition of a land use strategy for the AQMP.

Problems of Regional Level Planning

The Comprehensive Plan suffers from two important deficiencies:

- (1) the policies have not been set forth in a manner which is conducive to examining the effects on air quality of different types and degrees of land usage; CPO has not addressed the problem in any substantive fashion
- (2) implementation of the Plan is incumbent upon the cooperative actions of the CPO member cities' and county planning agencies. CPO has no enforcement authority to ensure that the plan is properly implemented.

In order for the Regional Comprehensive Plan to serve as a framework for identifying an AQMP land use strategy and thus ensure consistency with overall goals for growth and development, the Regional Plan must be evaluated for compliance with air quality standards.

In particular, the Regional Comprehensive Plan did not address the problems of critical areas where the policies may incur degradation of air quality or violate standards. These are as follows:

- the areas bordering the proposed regional transit network, particularly about the stations
- areas of proposed high density developments, e.g., Centre City
- areas of concentrated employment, business or industrial centers.

Historically, land development and growth patterns have followed the construction of transportation lines, e.g., the Western railroads, the national and state highway systems, and Bay Area Rapid Transit. While working to provide maximum accessibility on a regional scale, a comprehensive transit network will also serve to attract considerable development along the corridors of service and at points of access (stations). One example of a potential critical area is the North County area which is designated to be served by an express bus system. The Regional Comprehensive Plan has not addressed the problem of to what extent growth and development will be allowed in these corridors, and what their air quality implications will be.

While higher residential density communities and city centers will be better able to support a variety of services of which mass transit is most relevant for air quality, there is also the question of threshold levels at which excessive population or employment densities may lead to undesirable air pollution levels. There appears to be a tradeoff in land use planning between preserving air quality in undeveloped areas by concentrating sources of air pollution and extending the boundaries of urbanization to disperse the effects of air pollution. A similar problem exists for locating new industries, factories and other employment centers. Consideration must be extended to the possibility of "hot spots" or congested traffic configurations which will lead to undesirable air pollution levels at access points during the peak travel hours.

Another obstacle to regional level planning is the fact that local and county adherence to a regional comprehensive plan is on a voluntary basis; local general plans do not have to be consistent with the regional plan. Providing that an enforcing agency is designated, the AQMP will not suffer this problem.

While the AQMP is legally enforceable under the Clean Air Act and state enabling legislation, it faces the problem of most regional planning efforts if the tasks of AQMP development, implementation and enforcement are carried out by separate, independently operating agencies.

5.5 TWO CANDIDATE APPROACHES FOR INCORPORATING AIR QUALITY MANAGEMENT INTO THE SAN DIEGO LAND USE DECISION-MAKING PROCESS

"CALIFORNIA has no overall land use planning law, but they do have a mess of diverse laws and agencies often working against each other...The state planning office is a sham, with only a few employees. A number of land use planning bills are before the Legislature, none of them comparable to Florida's and none of them with a chance to pass." *

The approach to be taken in developing and implementing air quality maintenance procedures into San Diego's land-use decision-making process must meet two constraints mandated by the Clean Air Act. First, the approach should provide for a comprehensive review of any future growth and development significantly affecting AQMA air quality. Second, the State of California Air Resources Board is charged with the responsibility for complying with the Clean Air Act, although the ARB can delegate some of this responsibility to local APCDs if it so chooses. In cases where the state has failed to take appropriate action, present law dictates that the federal government must intervene.

Except in cases where a region's resources are shared by and vital to the public sector of a larger community, it would be presumptuous for either the state or the federal government to attempt to externally impose land-use controls on a given AQMA. "Outsiders" cannot be expected to make the trade-offs necessary to the formulation of an AQMP tailored

*Spoken by Gov. John McCall, Oregon, in his address to the 1974 Planning Conservation League meeting, 8 June 1974.

to the unique needs and goals of the populace within a specific region. Thus, it is appropriate that a local agency assume the responsibility for development and implementation of the air quality maintenance plan for San Diego. In order to deal effectively with a regional problem like air pollution, such an agency must have a regional perspective on the problem and the expertise necessary to deal with it.

Unfortunately in San Diego, as in many regions across the nation, no single agency has both the air pollution and the land use planning expertise required. This dichotomy of skills resides between the Comprehensive Planning Organization (CPO) and the County Air Pollution Control District (APCD). Thus, two basic alternatives are identified as possible institutional arrangements for incorporating air quality management into the San Diego land-use decision-making process. It should be noted that regardless of which institutional arrangement is eventually selected, the lead agency must rely heavily on the other agencies in the region in order for the maintenance plan to be truly effective.

5.5.1 Alternative "A" - AQMP Process Carried Out by CPO

This alternative would require the ARB to recognize CPO as the lead local agency in charge of developing an AQMP. The AQMP would become part of the regional comprehensive plan. THE APCD would lend technical assistance in plan development; however, CPO would assume the stronger position in developing the AQMP through their role in land use and transportation planning on matters of regional significance. (See Figure 5-1)

Alternative "A" should provide some regulatory power to CPO for enforcing elements of the general plan pertaining to regional air quality so that their plan is no longer viewed as being purely advisory. The intent would be to develop a combined land use/transportation plan which contains the balance necessary for minimizing VMT while also presenting a more unified and consolidated approach for state, regional and local government coordination. Most land use decisions would continue to be made by the local, general purpose governments; however, CPO should be in a position to exercise limited veto authority and to review all transportation projects and new developments of regional significance by being

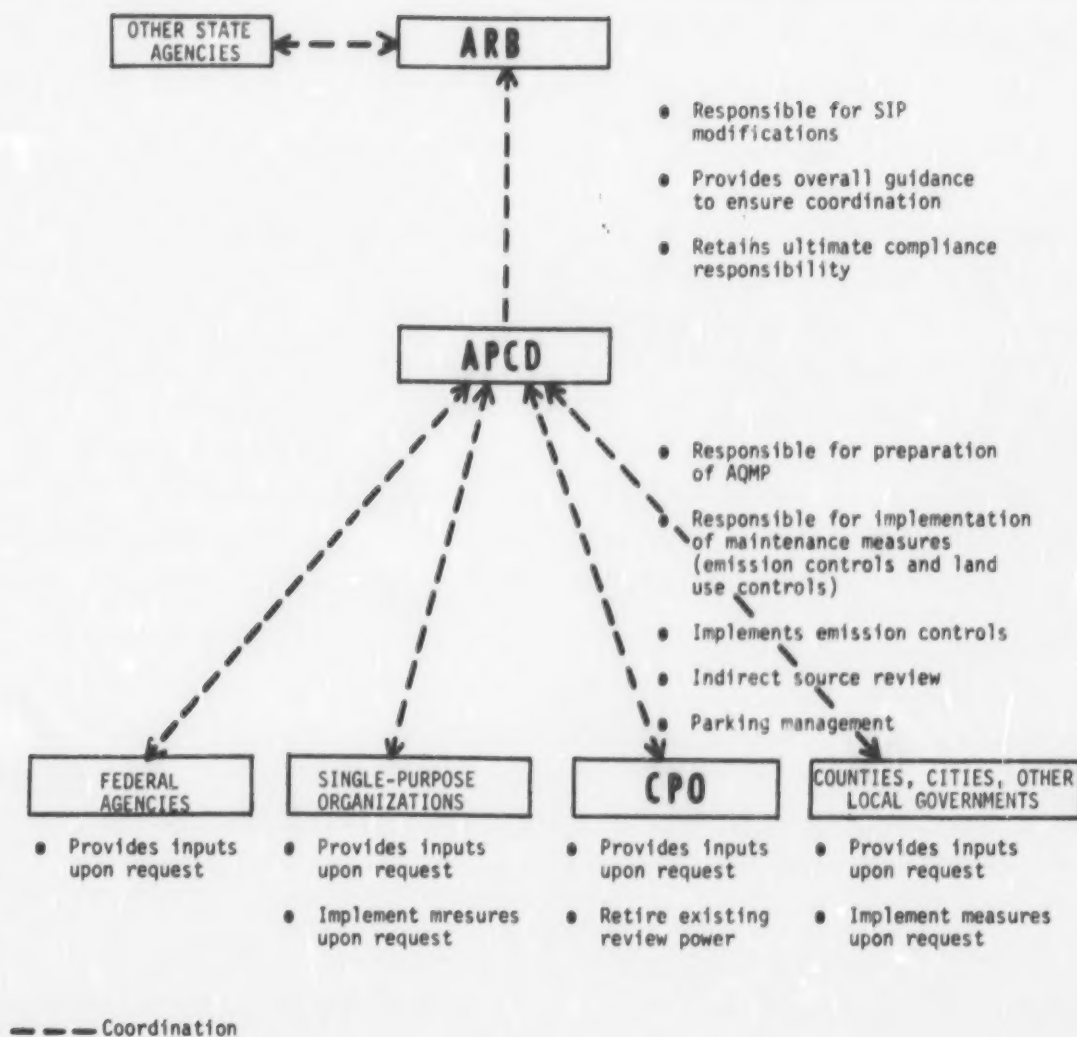


Figure 5-1. Alternative "A" - AQMP Process Carried Out by CPO

vested with review of indirect sources, parking management and parking facility planning, in addition to its A-95 review power.

Representatives from federal military installations in the San Diego region and the Environmental Protection Agency might assume a regular ex-officio role on the CPO board so that their respective activities could be made known further in advance.

5.5.2 Alternative "B" - AQMP Process Carried Out by the APCD

Under this alternative the County APCD would be responsible for preparation of and insuring local compliance with the San Diego AQMP. Since the CPO Board of Directors consists essentially of representatives from each of the incorporated cities within the County as well as the County itself, it seems appropriate that CPO should fulfill the role of coordinator of the planning of the land-use control element of the AQMP. Thus, under this institutional arrangement the APCD avoids entering directly into the land use planning arena while still retaining the local responsibility for compliance with the mandate of the Clean Air Act. (See Figure 5-2). CPO retains its role of planning coordinator as well as its other responsibilities with regard to parking management plans and A-95 review.

5.5.3 Discussion

The essential difference between the two organizational schemes presented lies in the delegation of the indirect source review responsibility. Clearly, the agency that has this responsibility holds the key to enforcement of a long-term air quality maintenance plan. On that basis, the same agency should also logically have the lead responsibility for the preparation of the AQMP.

In order for alternative A to become a reality, CPO must be granted the power of indirect source review, either by its member governments through a joint exercise of powers agreement, or by EPA or the State Air Resources Board under the authority and responsibility mandated in the Clean Air Act.*

*The Federal Register, Vol 39, No. 38, "Air Programs; Approval and Promulgation of Implementation Plans - Review of Indirect Sources," February 25, 1974.

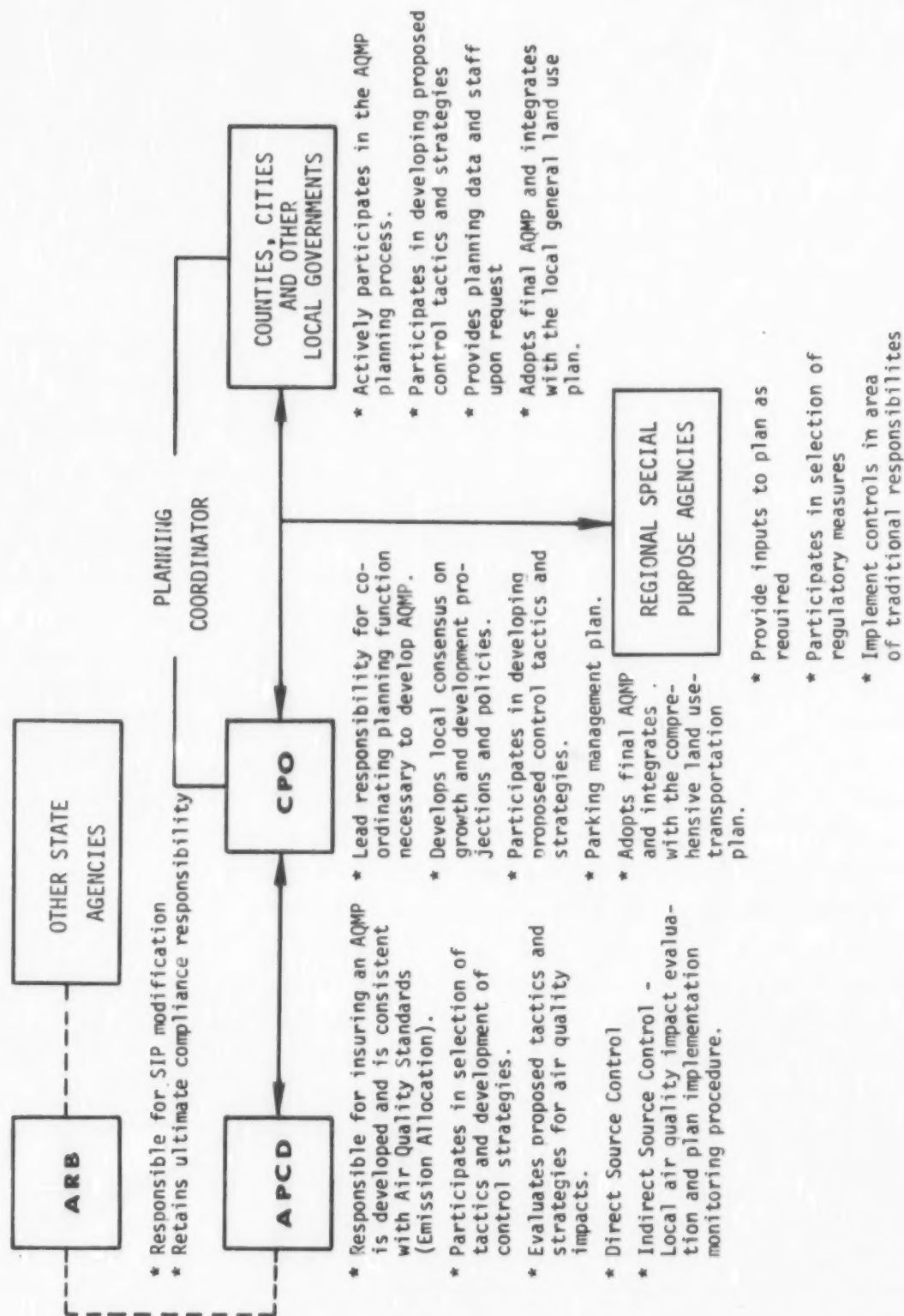


Figure 5-2. Alternative B - AQMP Process Carried Out By APCD

Alternative B currently suffers from uncertainties in the legal interpretation of the nature of indirect sources. The Attorney General of the State of California has written an opinion which states that local air pollution control districts currently have the authority to implement indirect source review. Conversely, a recent court decision (State Court of Appeals, Western Oil and Gas Association vs. Orange County Air Pollution Control District) reaffirmed the jurisdiction of the State Air Resources Board over motor vehicle emission control and in so doing raised the question of whether indirect source review should be considered stationary or mobile source control.

The uncertainty appears to center on the interpretation of the nature of the powers of the APCDs. If it is interpreted that the APCDs have only those powers specifically designated in the State Health and Safety Code, then serious questions are raised as to the validity of the Attorney General's opinion. Conversely, if it is interpreted that the APCDs have authority over all realms of air pollution control except those specifically pre-empted by higher authority, then it is likely that the Attorney General's opinion would hold. The court ruled that the APCD could not regulate the fuel composition for automobiles since this constituted a control over automobile emissions which should properly be the jurisdiction of the State Air Resources Board. The problem is that this decision may be considered to apply to indirect source review by analogy. It is conceivable that indirect source review may be considered regulation of automobile emissions, since it is precisely auto emissions which such review procedures are designed to minimize. The situation is further complicated by the fact that indirect source review may also be considered a form of land-use control -- an area which has always been the domain of local government. (Appendix K contains copies of both the State Attorney General's opinion and the decision of the State Court of Appeals.)

If it is resolved that the APCDs do not currently have authority to implement indirect source review, responsibility for the delegation of that authority would revert back to the State Air Resources Board and/or EPA, under the mandate of the Clean Air Act.

It seems proper that indirect sources should be classified as stationary sources and the Attorney General's office has asked for a clarification of the ruling with regard to this point.

Assuming that the court rules in favor of APCDs on this point, there remains but one potential drawback to alternative B. The problem is that the County Board of Supervisors must fulfill a dual role -- one role as administrators of the unincorporated areas of the county, and another as reviewers of the activities of the Air Pollution Control District, which has county-wide jurisdiction. Such a dual role could potentially lead to a conflict of interest on such development projects as the construction of county roads. This is not an insurmountable problem, although it is one which must be recognized and dealt with openly. It is not likely that the Board of Supervisors would attempt to usurp the authority of either the Air Pollution Control Officer or the Air Pollution Control Board. However, if such an unwritten relationship is unacceptable, the State Air Resources Board could serve as official review agency for county-sponsored indirect sources in order to prevent potential conflicts of interest.

A third option exists apart from the two alternatives just described. Under this option CPO and the APCD would share the indirect source review authority through the formation of a joint governing body. This option is attractive from the standpoint that it ensures a high degree of participation on the part of both CPO and APCD. However, should difficulties arise either in the preparation of the plan, the implementation or in the relationship between the two agencies, it would be difficult to assign the ultimate responsibility for preparation and enforcement of the AQMP to either agency (i.e., if anything should go wrong, a certain amount of "finger pointing" would be inevitable). Thus, this third alternative is potentially the least attractive from the standpoint of the assignment of responsibility.

6.0 LOCAL CONSIDERATIONS IN LAND USE PLANNING

The previous section has discussed a number of potential air quality maintenance measures, both from the perspective of improving existing control procedures and, in a more general sense, from the possible application of a host of other controls. Among the most difficult control measures to assess in terms of their potential applicability in San Diego were the land use control measures; the major problems result largely from the number of linkages required to translate a given land use decision (or plan) into its resultant air quality impact. To date, only a limited amount of work has been done in this area.

It was felt, from the inception of this study, that the selection of land use control measures was best accomplished by local planners and decision makers. Furthermore, it was felt that any measures selected for purposes of an AQMP could only be implemented if they had the support and endorsement of local institutions and governmental agencies. This section presents a discussion of local inputs concerning which land use control measures appear attractive and effective for use in the San Diego region. It is clearly recognized that the reduction of air pollutant emissions can be accomplished by means other than land use control measures. As crucial elements of the AQMP, for example, are maintaining vigorous controls on stationary point sources and successfully implementing and enforcing an aggressive transportation control plan to reduce vehicular emissions. Implicitly, the assumption of presently available technological controls has been made. Although this assumption has been made, it is certainly felt to be unrealistic and a conservative estimate of control measure effectiveness. The rationale for such an assumption is more from satisfying the legal requirements of developing a demonstrably effective AQMP than from any technical considerations. From a technical perspective, it is difficult to foresee remaining static in the availability of additional

hardware, process modification, product changes, etc. which will reduce industrial emissions, especially given more stringent control requirements. Indeed, if past experience in pollution control is any indicator, it may be that the tighter emission limits will provide the necessary impetus to advance the current state-of-the-art control techniques.

6.1 The Delphi Panel

There are a number of ways to solicit local inputs into a planning process. Traditionally, the most frequently used mechanisms are to conduct surveys of one kind or another, hold seminars, symposia, and conferences, or to conduct public hearings. Depending on the planning objectives, various combinations of the above procedures are also used. As mentioned, it was decided local inputs -- city, county, regional, and state -- were essential to the selection of any land use control measures to be incorporated into the AQMP. The vehicle used in this study to solicit such inputs was the Delphi technique -- a structured and controlled questionnaire with feedback.

A good description of Delphi is given by Dalkey:*

"In general, the Delphi procedures have three features: 1) anonymity, 2) controlled feedback, and 3) statistical group response. Anonymity effected by the use of questionnaires ... is a way of reducing the effect of dominant individuals. Controlled feed-back -- conducting the exercise in a sequence of rounds between which a summary of the results of the previous round are communicated to the participants -- is a device for reducing noise. Use of statistical definition of the group response is a way of reducing group pressure for conformity; at the end of the exercise there may still be a significant spread of individual opinions. Probably more important, the statistical group response is a device to assure that the opinion of every member of the group is represented in the final response."

In addition to and preceding the Delphi questionnaire, a series of interviews were conducted locally and over the telephone to gather both base data and agency attitudes concerning land use control alternatives for air pollution control. In part, these interviews set the stage for conducting the Delphi questionnaire.

*Dalkey, N.C., "The Delphi Method: An Experimental Study for Group Opinion," The RAND Corporation, RM-5888-PR, April 1969.

There were several reasons for selecting this procedure for gauging local attitudes towards development of an AQMP. It became quite apparent that air quality was a critical issue in San Diego and that most agencies (as well as individuals) were strongly opinionated concerning the ultimate solution to the problem. In this sense, then, achieving and maintaining clean air was a controversial issue locally. Because of this, it was felt desirable to avoid any direct agency confrontations. On the other hand, it was also felt broad representation from all sectors of the community were needed to add credibility to the planning process. Explicit attempts were made to insure representation from the public and private sectors, city, county, regional, and state agencies, business community and citizens' groups. As a means of accomplishing both objectives as well as incorporating local inputs within the time frame allowed by the study, a one-day (afternoon session) Delphi questionnaire session was planned. Appendix D contains more detailed information on which agencies were contacted and asked to participate, as well as which group did actually attend.

It should be emphasized that the results of the questionnaire are intended only to serve as an indicator of local thinking on potential control measures to be implemented. While the overall administration of the questionnaire was accomplished with no major difficulties, a number of points need to be raised concerning the limitations involved in interpreting the results. While every attempt was made to seek "balanced" representation within the group, it is virtually impossible to avoid individual view points that the group was "stacked" with planners or governmental officials or some other group. Specifically, during the San Diego session, a number of incidents occurred which may have influenced the final results:

- As expected, not all of the individuals who had agreed to attend did in fact participate. Consequently, the "balance" originally sought never materialized.
- A number of "experts" scheduled to participate sent representatives in their stead. Since this Delphi was structured to solicit "expert" opinion, it is difficult to gauge whether or not the level of expertise originally solicited was as good, better, or worse than the final group of participants.

- Concurrent to the Delphi, two other important meetings were being conducted in San Diego,* which accounted for a portion of the absenteeism cited above. Since these meetings were scheduled after our meeting had been set up, it was essentially impossible to reschedule. Of significance was the fact that a number of respondents who started the Delphi session were unable to complete it due to other commitments. Thus, the mixture of the group as a whole experienced some change during the afternoon.

Despite the above mentioned nuances, sufficient consensus was reached by the group on a number of issues that it was generally felt the exercise was very useful. The group initially assembled numbered twenty, with fourteen representatives completing the full seven rounds of interrogation.

Organizationally, the structure of the survey was aimed at addressing three issues with regard to land use control measures:

- Overall attractiveness -- From a shopping list of measures, the participants were asked to select the measures viewed to be "most attractive" in terms of implementability, effectiveness, minimum adverse socio-economic impacts and public acceptance. This phase of the exercise was completed first, since it was felt regardless of how effective a particular measure might be, if it was not implementable and acceptable, it would never receive serious planning consideration.
- Implementation obstacles -- Once it was determined which control measures were viewed as the most attractive, an assessment of the most critical implementation obstacles was solicited. The respondents were asked to consider the relative importance of six potential implementation obstacles -- lack of funding, existing governmental structure, lack of enabling legislation, inadequate state-of-the-art technology, public acceptance, and a lack of precedences or a hesitancy to be innovative.
- Effectiveness -- A number of specific and general objectives were cited and the respondents were asked to assess (by rank ordering) the relative effectiveness of the control measures for achieving the various objectives. Since the objectives dealt with the need for auto travel and growth and development issues, inferences can be drawn regarding the air quality implications of these measures.

*The other meetings taking place concurrently were a County Board of Supervisors meeting to discuss indirect source review requirements of EPA, and a CPO monthly board meeting.

Table 6-1 presents a summary of the chronological sequencing of issues addressed by the questionnaire. In addition to the actual survey form, a supplemental set of miscellaneous "fact sheets" were provided to each participant. This handout contained descriptive information on what each of the control measures were and a summary of the air pollution situation, i.e., recent emission inventory and air quality data. The intent of the handout was merely to provide backup information to the respondents to assist them in their decisions.

Table 6-1. Organization of Delphi Survey

<u>Round</u>	<u>Overall "Attractiveness"</u>	<u>Implementation Obstacles</u>	<u>Effectiveness</u>	<u>Comments</u>
One	First Iteration			Preliminary screening of the "best" (most attractive) control measures
Two	Second Iteration			Final selection of most attractive control measures
Three	Third Iteration			Ranking of overall attractiveness of control measures
Four	Fourth Iteration	First Iteration		Final consideration of overall attractiveness and first considera- tion of implementation obstacles
Five		Second Iteration		Reconsideration of ranking of implementation obstacles for most attractive control measures
Six			First Iteration	Ranking of control measures in terms of achieving specified objectives (effectiveness)
Seven			Second Iteration	Reconsideration of effectiveness rankings

Round One was intended to eliminate from further consideration those measures which the panel members did not feel offered much potential toward the solution of realistic land use control measures. The summary of the votes tallied from this round are summarized below in Table 6.2 (in order of highest number of votes received).

Table 6-2. Summary of Round One Results

<u>Control Measure</u>	<u>Votes</u>
A. Environmental Impact Statement (CEQA)	12
D. SB 1543 (or Similar Regional Development Plans)*	10
C. Taxation Policy to Preserve Non-Development Areas*	9
F. Direct Source Review	8
L. Capital Facility Ordinances	8
M. General Plan	8
I. Regional Water Quality Control Board (Permit Review)	7
Q. Indirect Source Review*	7
S. Development Timing Controls*	7
P. Capital Improvements Programming	6

*Potential Control Measures -- Not Currently in Use

All the remaining measures received five or less votes and were eliminated from additional consideration. The lack of votes was interpreted as a lack of confidence in the measures to provide meaningful land use controls. This could have been because of foreseeable implementation obstacles, enforcement problems, administrative costs, lack of effectiveness, high socio-economic costs, or any number of other concerns by the panelists.

The ten measures receiving the highest vote counts were carried over to Round Two, where participants were once again asked to vote for the six "best" measures. The results of this round are displayed in Table 6.3

Table 6-3. Summary of Round Two Results

<u>Control Measure</u>	<u>Votes</u>
A. Environmental Impact Statement (CEQA)	12
L. Capital Facility Ordinances	12
F. Direct Source Review	11
M. General Plan	11
C. Taxation Policy to Preserve Non-Developed Areas*	10
D. SB 1543 (or Similar Regional Development Plans)*	10
P. Capital Improvements Programming	10
Q. Indirect Source Review*	10
S. Development Timing Controls*	10

* Potential Control Measures -- Not Currently in Use

It is interesting to note the similarity of the Round One and Two tallies. The only measure which did not at least receive ten votes was "I" -- Regional Water Quality Control Board (Permit Review). Mainly for logistical purposes, it had been scheduled to more fully analyze the top six measures only (the Delphi session was scheduled for a single afternoon and it was felt that attempting to tabulate and feedback results on more than six measures would be both confusing and too time consuming). Thus, it was necessary to have a run-off vote on the five measures which had received ten votes. The purpose of the run-off was to select two additional measures

to go with control measures A, L, F, and M, which had received the highest vote counts. What was intended to be one run-off required three run-offs to settle on two additional control measures. For purposes of this analysis, measures "D" - SB 1543 (or Similar Regional Development Plans), and "Q" - Indirect Source Review - were added to the four measures cited above and carried on the latter rounds for more detailed analysis.

It is very clear from the closeness of the votes that a number of other measures merit a much closer examination - e.g., C - Taxation Policy to Preserve Non-Developed Areas, P - Capital Improvements Programming, and S - Development Timing Controls. Due to the tight time constraints, such evaluation was not possible during the Delphi survey; it is recommended that any subsequent work include a closer scrutiny of these measures and their potential applicability in San Diego.

As a result of the first two rounds (and the three run-offs), six measures were selected for a more extensive review. Round Three attempted to solicit responses on the relative attractiveness of the measures and requested the panelists to rank order each of the measures on a number of criteria -- potential effectiveness for improving air quality, technical feasibility, political-institutional feasibility, economic feasibility, and public acceptance. In addition to ranking the measures on the above factors, an overall "attractiveness" ranking was also asked for. This latter ranking was used for a comparison with the votes received in Round Two. In Round Four, after summarizing and feeding back the results of Round Three's overall "attractiveness" rankings, the panel was asked to reconsider for the last time, the most attractive land use control measures. Table 6.4 summarizes these results. The rankings of overall "attractiveness" were based on a scale of "1" (Best) to "6" (Worst). Therefore, the lower the number, the more attractive the measures were in the panelists' views.

Overall, there was good agreement among the group concerning which measures were the best (or most attractive) for the region. Only direct source review which had received one less vote in Round Two was in a different order by the end of Round Four and this rearrangement was considered insignificant.

Table 6.4 Comparison of "Best" (Round Two) and "Overall Attractiveness" (Round Three and Four) Rankings

<u>Control Measures</u>	<u>Round Three</u>	<u>Round Four</u>
1. A - EIS (CEQA)	3.1 $\pm$ 1.9	3.2 $\pm$ 1.7
2. L - Cap. Fac. Ord.	3.1 $\pm$ 1.5	2.7 $\pm$ 1.3
3. F - Dir. Source Rev.	3.0 $\pm$ 1.3	2.6 $\pm$ 1.4
4. M - General Plan	3.2 $\pm$ 1.9	3.5 $\pm$ 1.5
5. D - SB 1543 (or the like)	4.3 $\pm$ 1.9	4.3 $\pm$ 1.8
6. Q - Indir. Source Rev.	4.4 $\pm$ 1.2	4.8 $\pm$ 1.3

In addition to a final consideration of most attractive control measures, Round Four also inquired about the relative ranking of implementation obstacles likely to be encountered with each control measure. In this round, the six implementation obstacles were to be ranked in order of importance for implementing a given control measure from "most important," (1) to "least important" (6). Overall, some interesting, but not unexpected, rankings were arrived at by the group. Four of the six measures rated the existing government structure as the most important implementation obstacle (see Table 6.5). Conversely, five of the measures cited lack of enabling legislation as the least important implementation obstacle. This resulted from the fact that these five measures already had the necessary legislation for implementation.

Table 6.5 Results of Round Four -- Ranking of Implementation Obstacles

<u>Control Measure</u>	<u>Most Important</u>	<u>Least Important</u>
F - Direct Source Review	Gov't Structure	Lack of Enabling Leg.
A - EIS (CEQA)	Gov't Structure	Lack of Enabling Leg.
L - Cap. Facility Ord.	Gov't Structure	Lack of Enabling Leg.
M - General Plan	Lack of Funding	Lack of Enabling Leg.
D - SB 1543 (or similar)	Gov't Structure	Lack of Precedents
Q - Indirect Source Review	Public Acceptance	Lack of Enabling Leg.

To be realistic at evaluating the least important implementation obstacles, the five measures which have "lack of enabling legislation" should cite the second least important obstacle. This is because the issue of enabling legislation for measures F, A, L, M, and Q, is essentially irrelevant. In this case, for the five measures mentioned above, the least important obstacles would then become; lack of precedents, public acceptance, inadequate state-of-the-art technology, lack of precedents, and lack of precedents, respectively.

In Round Five, the participants were asked to reconsider their Round Four responses in light of the group answers for that round. These responses, like all the previous rounds, were tabulated and the results visually displayed for the group's consideration. The results for Round Five were nearly identical in terms of relative rank orderings, showing good agreement among the group on the importance of implementation obstacles. In terms of achieving a more uniform group consensus, the reduction of the standard deviations, σ , illustrates closer overall agreement among the group's respondents. Also, of significance was the reinforcement of positions held by the group in their ordering of "most important" obstacles. This can be seen by the overall lowering of the group means for all the control measures. Table 6.6 illustrates this by comparing the two most important implementation obstacles for each control measure from Round Four and Round Five.

It is clear from the results that the group felt the present governmental structure in San Diego was the most significant impediment to more effective land use controls. Of secondary importance on a number of measures, the group felt that a lack of funding or inadequate state-of-the-art technology were the major obstacles.

Despite the fact that a certain amount of convergence of opinion did take place between Rounds Four and Five, certain viewpoints persisted in being significantly different from the group means. To accommodate this, each of the respondents who felt in Round Five that their different viewpoint was correct was asked to give reasons for his (or her) "extreme values." The definition of "extreme values" was arbitrarily to be determined by the individuals with the general guidelines that probably any answers which

deviated more than 2-3 units from the group means might be considered to fall into this category. A number of individuals took this opportunity to voice their opinion. Had time allowed, it would have been helpful to summarize all the reasons posed for divergent views and to feed this information back to the group for a third round of interrogation on implementation obstacles. A brief summary of the comments received in Round Five is presented below without any attempt to comment extensively on them.

Summary of Round Five Comments

- F - Direct Source Review - Two parties did not see how governmental structure could be the problem since the APCD existed and was operative. Another felt that if one considered "emission control (add on)," then he could understand the group's rating.
- A - Environmental Impact Statement (CEQA) - With respect to the relatively high rating given for inadequate state-of-the-art technology, one individual felt the technology did exist and that the problem with the general plan EIR's was they "have not been challenged as to air quality content." He felt if this was done quantitatively, there would be no problem. Another individual felt the role of public acceptance was more important than indicated because EIA had become very time consuming and expensive "requiring other tasks to be ignored or deferred."
- L - Capital Facilities Ordinances - One individual felt governmental structure was overemphasized in importance since it "does not appear to be difficult to implement along with existing procedures." Another individual identified the problem to be not the governmental structure, but the lack of implementation. It was pointed out the City of San Diego had a 600-10 Policy, but the failure has been its successful implementation and other jurisdictions passing similar legislation and implementing it.
- M - General Plan - Two individuals disagreed that funding was a problem. They felt the general plans have "overall funding" or an "inordinate amount of funding, staff time, and still is ineffective for air quality control."
- D - SB 1543 (or Similar Regional Development Plans) - Two individuals disagreed that enabling legislation was the most important constraint. Their views appeared more

Table 6.6. Results of Rounds Four and Five -- Comparison of Means and Standard Deviations for Most Important Implementation Obstacles*

	R O U N D F O U R			R O U N D F I V E		
	Control Measure	Most Important Implemen. Obstacles	Group Averages	Most Important Implemen. Obstacles	Group Averages	
F - Direct Source		(1) Gov't. Structure (2) Lack of Funding	2.3 ± 1.4 3.1 ± 1.5	(1) Gov't. Structure (2) Lack of Funding	2.1 ± 1.4 2.5 ± 1.2	
A - Environmental Impact State- ment		(1) Gov't. Structure (2) Inadequate Tech.	2.4 ± 1.3 2.9 ± 1.8	(1) Gov't. Structure (2) Inadequate Tech.	2.0 ± 0.9 2.6 ± 1.4	
L - Capital Facil. Ordnances		(1) Gov't. Structure (2) Lack of Funding	2.6 ± 1.5 3.1 ± 1.3	(1) Gov't. Structure (2) Lack of Funding	1.9 ± 1.4 2.7 ± 1.3	
M - General Plan		(1) Lack of Funding (2) Gov't. Structure	2.7 ± 1.8 2.8 ± 1.6	(1) Lack of Funding (2) Gov't. Structure	1.9 ± 1.5 2.0 ± 0.5	
D - SB 1543 (or Similar Plans)		(1) Gov't. Structure (2) Lack of Enabling Legislation	2.5 ± 1.2 3.0 ± 1.8	(1) Gov't. Structure (2) Lack of Enabling Legislation	1.9 ± 0.8 3.0 ± 1.8	
Q - Indirect Source Review		(1) Public Acceptance (2) Inadequate Tech.	2.5 ± 1.6 3.1 ± 1.8	(1) Public Acceptance (2) Inadequate Tech.	1.9 ± 1.3 2.6 ± 1.5	

*Range of rankings from Most Important (1) to Least Important (6)

philosophical than specific to addressing this measure. "Enabling legislation does not appear to be an overriding problem in California." The second divergent viewpoint similarly felt "enabling legislation is possible on any subject in this state and if mandated will occur."

- Q - Indirect Source Review - One respondent felt public acceptance was over-emphasized and that "given alternatives of effective programs, I don't believe public acceptance is as great a deterrent as proper inter-governmental coordination and funds." Another individual felt the lack of enabling legislation (and more accurately, the proposed regulations) were more important than shown by the group. He felt there was an absence of legislation which would "assure enforcement -- loopholes in proposed indirect source legislation are apparent."

It appeared overall that the views expressed were in part the result of different interpretations of the questionnaire. Others had sincere professional differences of opinion. Under any interpretation, however, the point which appeared most consistent was a dissatisfaction with the present governmental structure for implementation of meaningful land use control.

The purpose of Rounds Six and Seven were to get a qualitative feeling for the relative effectiveness of the measures at achieving a number of objectives - reducing the need for auto travel, limiting the rate of urbanization in rural areas, promoting balanced development of residential and commercial areas, and controlling the extent and direction of future growth. In these rounds, the control measures were compared relative to one another. Table 6-7 summarizes the results of the two most important measures for achieving each of the stated objectives.

Properly implemented, all of the objectives cited would serve to reduce or minimize air pollution emissions. As in Rounds Four and Five, only minor differences occurred as the result of feedback, and Round Seven results were very similar to Round Six results. The one change which did take place was under "limiting the rate of urbanization in rural areas," where the second most effective measure cited in Round Seven was SB 1543 (or Similar Regional Development Plans). This change made the consensus of the group unanimous as far as the top two most

Table 6-7. Results of Rounds Six and Seven -- Summary of Most Effective Control Measures

<u>Objective</u>	R O U N D S I X		R O U N D S E V E N	
	<u>Most Effective Measures</u>	<u>Rating*</u>	<u>Most Effective Measures</u>	<u>Rating*</u>
To Reduce Need For Auto Travel	(1) General Plan	2.3 ± 1.6	(1) General Plan	2.4 ± 1.5
	(2) SB 1543 (or Similar)	3.0 ± 1.6	(2) SB 1543 (or Similar)	2.8 ± 1.5
To Limit Rate of Urbanization in Rural Areas	(1) General Plan	2.4 ± 1.7	(1) General Plan	2.2 ± 1.0
	(2) Capital Facilities Ordinances	2.7 ± 1.2	(2) SB 1543 (or Similar)	2.5 ± 1.3
To Promote Balanced Development of Residential/Commercial Areas	(1) General Plan	1.5 ± 0.9	(1) General Plan	1.5 ± 1.0
	(2) SB 1543 (or Similar)	2.9 ± 1.5	(2) SB 1543 (or Similar)	2.9 ± 1.3
To Control Ex- tent and Direction of Future Growth	(1) General Plan	2.1 ± 1.5	(1) General Plan	2.3 ± 1.5
	(2) SB 1543 (or Similar)	2.3 ± 1.2	(2) SB 1543 (or Similar)	2.3 ± 1.1

*Range of ratings from "Most Effective (1)" to "Least Effective (6)"

effective measures for achieving the regional growth and development goals. There was unanimity among the group for the third most effective measure as well -- capital facility ordinances.

It is interesting to compare the results of the group's responses from Round Seven with the Round Three category "Potential Effectiveness," where the group was specifically directed to judge effectiveness "from the viewpoint of improving air quality." In this latter case the most effective measures were direct and indirect source review (tied for "best") followed by SB 1543 (or Similar Regional Development Plans). For improving air quality, the General Plan was rated least effective. Thus, there appears to be an apparent discrepancy among the group's responses since many of the objectives in Round Seven would improve air quality.

As in Round Five, the group was requested to submit responses if their viewpoints for Round Seven were substantially different from the Round Six group means. A number of such responses were received. Several individuals felt strongly that the general plan has not been, is not now, and probably will not be effective at achieving the stated objectives. Among some of the comments received concerning the effectiveness of the general plan were:

"The general plan is not an effective tool; there is no commitment to it."

"G.P. is least effective way to reduce need to auto travel. I consider General Plans 'shaky' as they pertain to land use."

"Obviously the G.P. in San Diego hasn't reduced need for cars... General Plan approved calls for more growth."

"None of the general plans have enforceable implementation or phasing provisions. Hence are and will be ineffective I believe the measure is a 'motherhood' type. I maintain regional direct and indirect source control with regional allocation and capital facilities control will be most effective."

A possible rationale for the apparent discrepancy noted between Rounds Three and Seven was offered by one participant when he wrote:

"The effectiveness criterion measured is oriented toward preventing and controlling future events. Perhaps this is

why the general plan was ranked as most effective in controlling future events. For actually maintaining current standards, I view direct source control, indirect source control and capital facilities ordinance, and CEQA as the most important."

Overall, the results of Round Seven were the most surprising to the TRW personnel working on the program. In developing the AQMP, it was difficult to envision the general plans developed in the various communities as the most important and effective means to control land use. Traditionally, general plans have served only as guidelines to follow in urban development patterns, without specific implementation and enforcement mechanisms associated with them to ensure development would proceed as the plan envisioned.

In summary, a number of interesting insights were gained from the Delphi questionnaire. As one might have expected, the measures originally selected as the most attractive were for the most part already in existence. This would certainly speak favorably for the present governmental structure plus the fact that the AQMP development program was never intended to "reinvent the wheel." Of the most important future controls, indirect source review and SB 1543 (or Similar Alternatives) emerged as the most actively supported alternatives followed closely by taxation policy to preserve non-developed areas and development timing controls. It is highly recommended that these controls be given much more detailed study to assess the full range of impacts they would have in San Diego, including their land use and air quality implications. With regard to implementation obstacles, the present governmental structure appeared to be the most serious problem for a number of measures.

7.0 AN AIR QUALITY MAINTENANCE PLAN FOR SAN DIEGO

An air quality maintenance plan may be visualized to consist of a technological control element and a land use control element. As a region grows in population, per capita consumption, and hence emissions, technological controls must become increasingly stringent in order for the region to accommodate the growth and yet maintain air quality. The converse may also be considered to hold -- if technological controls cannot alone serve to maintain air quality, land use controls must bear an increasing portion of the burden as growth progresses. Thus we see that a very delicate balance must be maintained between the two control elements and that this balance will become increasingly difficult to maintain as time passes.

The previous sections have presented some local insights into the current planning process, strengths and weaknesses of current planning tools, and possible future control measures. The Delphi questionnaire specifically addressed a number of control measures, each of which was assessed individually. In reality, it will be the application of numerous measures in a well-conceived control strategy package which is required to be most effective in San Diego. Ideally, such a package would contain measures which can compliment (and reinforce) each other rather than conflict, and which can gain sufficient support to be successfully implemented and enforced throughout the region. This chapter discusses very briefly a possible control strategy approach. Appendix L provides an evaluation of potential conflicts of the AQMP with other ongoing planning programs.

7.1 THE LAND-USE CONTROL ELEMENT

Of the nineteen possible control measures suggested in the Delphi procedure, nine emerged as the most viable land use controls for San Diego, and are herein recommended as the basis for a land use control strategy. Six of these are presently in effect in one form or another. These measures include CEQA (and its requirement for EIS's), taxation policy to preserve non-developed areas (i.e., Williamson Act - see Appendix E), direct source review, capital facility ordinances, general

plans, and capital improvements programming. By and large, no major conflicts exist among these programs and each was implemented for a specific purpose.

The most viable measures not currently operative are: SB 1543 (or similar plan), indirect source review, and development timing controls. The implementation of these measures along with the vigorous application of the six previously existing measures will provide the San Diego AQMA with a substantial land use/air quality management program. SB 1543 (or similar plan) would provide the framework or criteria for the evaluation of both proposed development policies and individual projects. Direct source review, indirect source review, and CEQA's requirement of environmental impact statements for both public and private development projects may be used as the principal tools for monitoring and enforcement of the control elements of the AQMP. Finally, capital improvements programming, capital facility ordinances, and development timing controls can serve to reduce the rate of growth, while taxation policies to preserve non-developed areas can serve to discourage urban sprawl and its resulting auto dependency. The implementation of these latter three measures would necessarily involve a detailed re-examination of the working assumptions used in the development of the twenty year projection of the regional comprehensive plan. Such a re-examination should reveal the key assumptions made and thus point to more specific definitions of how these measures may be applied to ensure that what has been assumed will actually materialize.

In strengthening the application of those measures currently in existence for land use control and in assessing air quality, one can generally recommend a more explicit consideration of air quality. A possible reservation to this recommendation might be the duplication of efforts at various planning and review levels. For example, one could easily foresee an air quality planning element for local general plans. However, the California Air Resources Board for several good reasons specifically did not recommend such action (7-1):

- (1) Legislative action in amending the California Environmental Quality Act (CEQA) by AB 889 in December of 1972 and the resulting requirement for an environmental impact report on elements of general plans in the Resources Agency Guidelines

should accomplish similar results. The addition of another general plan element would not provide further gains in air quality than the December 1972 mandate of the Legislature and would prove to be a redundant process (emphasis added).

- (2) A local air pollution element alone cannot solve the major problem recognized by the Legislature in SB 981 of inter-regional transport of pollutants, nor can it provide for total basin-wide development adequately harmonized with adopted air quality standards.
- (3) In the last year and a half the ARB staff has been reviewing and evaluating environmental impact reports under the National Environmental Protection (sic) Act (NEPA) and CEQA. Although the need is urgent, the cumulative impact on air quality of the emissions projected by many individual projects has not been possible to assess with sufficient specificity.

It is clear that an appropriate balance is required to ensure sufficient, detailed consideration of air quality impacts without undue duplication of requirements among the various regulatory and review agencies. Also, to be avoided is a long sequential series of reviews prior to approval of a land use decision. A closer cooperative planning effort is required from all the local, regional, and state officials involved. For example, it has been suggested by numerous parties that certain requirements of CEQA and the California Coastal Land Environment Element are not only redundant but that the sequence of events required of developers to obtain a land use change is inefficient. Current land use planning and regulatory activities need to be strengthened, where possible, to facilitate reviews, implementation, and enforcement; in some cases, it may be desirable to streamline certain controls which appear unduly repetitive.

7.2 MAINTENANCE REQUIREMENTS BEYOND 1985

The attainment strategy presented in Section 4 was considered to be a logical and reasonable extension of present control technology. Unfortunately, such a simple extension of present technology will not be sufficient for the longer term maintenance of air quality in San Diego. Assuming that the attainment strategy is implemented and actually does result in attainment by 1985, one is faced with the prospect of another 20% increase in population by 1995, with an associated 30% increase in VMT and 50% increase in commercial/air carrier movements. Similar growth is expected to occur in essentially every source category listed in the emission inventory.

If such growth is to be accommodated, what will be required is the maximum extension of present technology as well as the vigorous enforcement of the land use control measures identified in the preceding discussion. For the purposes of the present discussion, maximum control will be defined as 90% control over sources not currently under such control. These sources include motorcycles, heavy duty vehicles, off-road heavy-duty vehicles, and aircraft (both commercial and military). Maximum control by 1985 will result in reactive hydrocarbon emissions of approximately 42 tons/day. If a 25% overall growth factor is assumed for the entire emission inventory by 1995, the resulting emissions will be 53 tons/day (thus matching the allowable emissions limit previously defined by the rollback procedure).

The recommended maintenance strategy is summarized in Table 7-1.

Table 7-1. Recommended Maintenance Strategy

<u>Technological Control Element</u>	<u>Land-Use Control Element</u>
● 90% reduction in heavy duty vehicle emissions ● 90% reduction in motorcycle emissions ● 90% reduction in aircraft emissions	● Emission allocation procedure (SB 1543 or equivalent) ● Direct and indirect source review as well as EIR review (CEQA) ● Capital facility ordinances and development timing controls ● Taxation policy to preserve undeveloped areas

The procedures and timing used for attempting to implement a control measure are as important, if not more so, than the mere identification of which measures should be included in an overall control strategy. While it is felt the measures suggested in this section comprise the nucleus for a very comprehensive, meaningful, and effective control strategy program, it is highly recommended that a more detailed evaluation be made of specific implementation procedures and identification of implementation obstacles.

Now consider this: Suppose it is later discovered that the maximum control sought is not possible (a very likely prospect). In this

situation the burden of control becomes shifted to the land-use control element of the maintenance plan. Since it has already been assumed that the land use controls would be applied in order to assure that the CPO Controlled Trends projection will actually occur as envisioned, any failure to attain the maximum control originally hoped for will force the application of land use controls to reduce VMT even further than that envisioned in the Regional Comprehensive Plan. The ramifications of this result are of tremendous significance to the future growth and development of the San Diego region. In order to enforce the requirements of the maintenance of air quality, it may very well be necessary to enforce land use controls to limit growth in San Diego in a fashion which goes beyond what has been endorsed in the Regional Comprehensive Plan. The magnitude of this departure will depend heavily upon the magnitude of the gap between maximum control and the control efficiency actually achieved.

The preceding discussion serves to highlight the fundamental difference between a regional comprehensive plan and an air quality maintenance plan. A regional comprehensive plan is formulated to balance a multitude of goals and desires whereas an AQMP is formulated to satisfy a single purpose. A regional comprehensive plan is intended to be flexible, responding to the changing needs of the populace, while an air quality maintenance plan is inflexible in the insistence that air quality standards not be violated in the process.

In a general sense, these two plans are not necessarily at odds with one another, and indeed, they may be formulated to reinforce each other. In the case of San Diego, the key element required for such a happy marriage is technology. If the technology can be developed to control key sources, then all is well. If the technology fails to materialize as fully as required, then the plans must diverge from each other and the public values which underlie each of the plans must be re-examined in order to resolve the conflict.

7.3 STATUS OF TECHNOLOGICAL CONTROLS

Since the achievement of substantial reductions in reactive hydrocarbon emissions from certain key source categories is a crucial determinant of the eventual form of the air quality maintenance plan, an evaluation of the present status of control in those areas is warranted.

In the area of motorcycle control, EPA is currently investigating the nature and feasibility of control of these sources (7-1). Basically, two distinct levels of control are contemplated with each level applying to a different time frame. In the short term (1977-1980), reductions on the order of 50% from new motorcycles are anticipated through the use of engine and carburetor system modifications (port timing, location, and size, and better air/fuel mixture control). In the long term (1980 and beyond), reductions such that all new motorcycles meet the same emission standards as light-duty vehicles are anticipated to be accomplished through the use of oxidizing catalysts and/or thermal converters. Such control would constitute roughly a 90% reduction in new motorcycle emissions. Further, preliminary studies (7-2) indicate that motorcycles undergo a rapid turnover in their population relative to the turnover rate for automobiles. If this result is verified, it means that the control of new motorcycles should provide rapid results. EPA is anticipating the promulgation of emission regulations for new motorcycles by the end of this year.

In the area of aircraft control, EPA has studied the problem and had concluded that substantial reductions in emissions may be achieved through the modification of ground operating procedures (aircraft taxi and idle mode operations). (7-3) Unfortunately, there are apparently serious problems with regard to FAA safety regulations which must be overcome before such modifications are allowed. Meanwhile, the introduction of newer, "cleaner" engines into the total aircraft mix will result in moderate (~30%) reductions from this source category. With regard to control of military aircraft operating procedures, there has apparently been no serious attempt made to discuss the problem with appropriate military representatives.

Finally, in the area of heavy duty vehicle control, the State Air Resources Board has issued regulations concerning control of HDV emissions beginning with the 1975 model year. The projections made in Section 3 of this report indicate that substantial reductions will occur by 1985. However, for the purposes of satisfying maintenance requirements, additional control is necessary. As mentioned previously, the ARB has proposed that heavy duty vehicles be retrofitted with oxidizing catalysts in San Diego. It seems logical that emissions from new HDVs should be controlled in an equally stringent fashion.

REFERENCES

- 7-1 Personal communication with Bill Oliver, EPA Mobile Source Control Division, Ann Arbor, Michigan, August 8, 1974.
- 7-2 Personal communication with Ron Mueller, EPA Region IX, San Francisco, August 8, 1974.
- 7-3 Jones, et al., "The Federal Aircraft Emission Control Program's Standards and Their Basis," Air Pollution Control Association Journal, Vol. 24., No. 1, page 23, January 1974.

APPENDICES

APPENDIX A-SAN DIEGO AIR QUALITY DATA

A-1 INTRODUCTION

The air quality data for San Diego County are used to establish a baseline for air pollutants covered by the Federal Air Quality standards. (See Table A-1 for Air Quality Standards). The presentation of data is designed to assess the accuracy of 1972 as a base-year and to relate observed data to standards so that a rollback factor can be assigned for each pollutant. A simple mathematical model is used to estimate expected air pollutant values. Historical comparisons are made to check for long term trends, and seasonal and daily variations are presented where appropriate.

Data used in this section were obtained from the San Diego County APCD, the California Air Resources Board, and the National Air Sampling Network. Table A-2 lists the addresses of monitoring stations used in this study. The pollutants will be discussed in the order of importance relative to air quality standards. No attempt is made to assess the accuracy of monitoring data.

The monitoring stations listed in Table A-2 is situated so as to be representative of population exposure to air pollutants in San Diego County.⁴⁻¹ The area just north of metropolitan San Diego is less well covered than the rest of the county. Also, maximum carbon monoxide concentrations may not be measured by the current network, nor can pollutant transport from the Los Angeles basin be accurately assessed. It will be shown later in this appendix that the worst offending pollutant, oxidant, reaches similar maximum values at several stations in the county.

A.2 OXIDANT

Oxidant data were assembled in three different ways to examine trends over time. First, Table A-3 and Figure A-1 show the annual averages of daily maximum hourly averages for stations in San Diego County which have measured oxidant since 1963. It can be seen that the trend since the early 1960's has been to somewhat lower oxidant values. 1972 appears not to be out of line with this trend. Also, there is a moderate difference in oxidant values at various stations in 1972, with extremes in the annual average of daily maximum hourly averages which are .05 ppm at downtown San Diego and .08 ppm at Oceanside.

Second, Figure A-2 shows the seasonal variation of oxidant for years in which data were available. All stations showed October to be the month with the highest average of daily maximum hourly averages in the 1963 to 1967 period, with a smaller peak occurring in February. In more recent years, however, the main peak has shifted to the spring season, with a slightly lower peak in September. The reason for this change is not clear at this time.

Third, the daily fluxuation in oxidant was investigated in order to assess possible transport phenomena. It has been shown,^{A-2} for instance, that daily oxidant peaks may occur as late as 10 P.M. in areas downwind of the Los Angeles air basin. Figure A-3 shows oxidant values by hour of the day averaged over the peak oxidant month for the stations in San Diego County. It appears that all stations in San Diego County have a daily oxidant maximum between noon and 3 P.M., with summer peaks occurring somewhat earlier in the day than winter peaks. Transport is apparently not a significant factor influencing the time of oxidant peak. This should not necessarily be interpreted to mean that pollutants are not transported to sites in San Diego County from elsewhere. Rather, the proper interpretation should be that oxidant is formed in place on a daily cycle at these stations.

Oxidant values for a given station were treated in a manner described later in this appendix and were found to be approximately log-normally distributed over time. Cumulative frequency distributions for oxidant were

used to estimate expected maximum hourly values (Figures A-4 to A-10). Table A-4 compares the observed historical maximum oxidant readings in San Diego County with these calculated values. Predicted and observed values agree fairly well except at Escondido (where a partial year's data was used to construct the cumulative frequency plot) and at El Cajon. Compared to historical yearly maximum values, however, the predicted values are not out of line and suggest that about 0.30 ppm would be the expected maximum to be observed in San Diego County. A previous study has indicated 0.31 ppm as an expected oxidant maximum for San Diego County using a similar model of the available data.^{A-6} The observed maximum of 0.32 ppm at El Cajon in 1972 is thus in line with predicted maxima and should therefore, be used to calculate the required emission reduction to meet the federal oxidant standard. As shown in Table 1, a 75% rollback will be necessary. As was noted previously, stations in the county are not tremendously varied in average oxidant values. The same appears true for maximum oxidant values, supporting the suggestion that rollback be applied equally throughout the county.

A.3 CARBON MONOXIDE

Carbon Monoxide data were available during 1972 for stations at El Cajon and in downtown San Diego. Table A-5 showing the average of daily maximum hourly averages for several years, indicates that CO levels have not changed dramatically since 1963 (1973 may be an exception). The seasonal pattern, depicted in Figure A-11, illustrates that winter is the high CO season (November to February). As with overall average CO levels, the seasonal pattern appears not to have changed significantly since 1963. Unlike oxidant, CO does not show a strong diurnal pattern in San Diego.

Tables A-6 and A-7 show the hourly maximum and 8 hour maximum average, respectively, for several years. Using a Larsen model (Section A.7) and the 1972 hourly and daily average CO distributions (Figure A-12), an approximate 8 hour distribution was constructed. The predicted 8 hour maximum is about 20 ppm for 1972, compared to 19 ppm actually observed. The 8 hour distribution also predicts that 3.5% of the CO values would be greater than 9 ppm on an 8 hour moving average, compared to 4.7% observed.^{A-3} It appears that the approximate distribution is fairly consistent with

observed data. As explained in more detail later, the 8 hour maximum is the value upon which rollback will have to be calculated if both the hourly and 8 hour standards are to be met.

A.4 SUSPENDED PARTICULATE MATTER (Hi-Volume Sampling)

Data from three stations in San Diego County are listed in Tables A-8 and A-9. The highest annual geometric mean for 1972 was reported at El Cajon, 97 micrograms per cubic meter. The distribution of suspended particulate values (Figure A-14) is such that a proportional rollback of the geometric mean to the standard of $75 \mu\text{g}/\text{M}^3$ would also roll back the maximum value ($288 \mu\text{g}/\text{M}^3$) to below $260 \mu\text{g}/\text{M}^3$. The NASN and APCD stations in downtown San Diego are currently very near to or are meeting the standards.

Figure A-15 illustrates that suspended particulate matter, like CO, tends to be highest in winter. This suggests that the aerosol upon heavy loading is probably non-photochemical in nature. Since the Hi-Volume method is based on a 24 hour average sample, diurnal patterns cannot be discerned.

A.5 NITROGEN DIOXIDE

NO_2 levels in San Diego County are currently below the Federal Standard of .05 ppm (annual average) by 25 to 60 percent as shown in Table A-11. Although NO_2 levels are not as far below standards as those of SO_2 , reductions in emissions may be expected as automobiles come under NO_2 control so that it is not anticipated that standards will be exceeded in the near future.

A.6 SULFUR DIOXIDE

SO_2 levels in San Diego County are currently below the Federal Standards for both hourly and daily averages, as well as the yearly average. Table A-10 indicates that SO_2 levels must increase by almost a power of ten in order to exceed the yearly average standard. The 24-hour standard could allow nearly a sevenfold increase in SO_2 emissions. This magnitude of increase is not expected in the near future. The readings are included in this appendix since there may be concern over possible high sulfur fuel use in the future and its impact on SO_2 levels.

A.7 A LOG-NORMAL MODEL FOR AIR POLLUTANT DATA⁴

Many air pollutants can be described as log-normally distributed over a year's period. A plot of frequency of occurrence vs. concentration often shows a distribution weighted at the high end. When the log of concentration is used in such a plot, the distribution approximates a normal or Gaussian curve. Two parameters are needed to define such a distribution; M_g , the geometric mean, and S_g , the geometric standard deviation. These are defined as follows:

$$M_g = \left[\prod_{c_i=1}^N c_i \right]^{1/N} = \exp \left[\frac{1}{N} \left(\sum_{c_i=1}^N \ln c_i \right) \right] \quad (1)$$

$$S_g = \exp \left[\frac{1}{N} \sum (\ln c_i - \ln M_g)^2 \right]^{1/2} \quad (2)$$

where c_i is the concentration of the individual measurements.

Air pollutant data can be handled in a graphical fashion using the log-normal assumption. Plots of observed pollutant values vs. cumulative frequency are made on log-probability paper (see Figures A-4 - A-10). The equation for the best fit line drawn through the points is:

$$\ln c_i = \ln M_g + z \ln S_g \quad (3)$$

$$\text{or} \quad c_i = M_g S_g^{z_i} \quad (4)$$

where z is the number of standard deviations that c_i occurs from the geometric mean. One standard deviation would occur at 84% (or 16%). M_g is then estimated from c_i at 50%. It follows that:

$$\ln c_{84\%} = \ln M_g + (1) \ln S_g \quad (5)$$

$$\text{or} \quad S_g = c_{84\%}/c_{50\%} \quad (6)$$

The maximum expected value* is calculated as follows. If N measurements are made per year, a z value for (1-1/N) in percent is taken from a normal error table. Then:

$$C_{\max} = M_g S_g^z (1-1/N)\% \quad 7$$

Alternatively, $C_{\max}$ may be read from the log-probability graph at (1-1/N)%.

The log-normal model may also be used to estimate the number or percent of days which a pollutant is expected to exceed a standard. The percent may be read directly from a log-normal plot or calculated from equation (4) using c_i as the concentration to be exceeded. M_g and S_g are known so that a z value can be calculated, followed by obtaining the percent from a normal error table.

A.8 RELATIONSHIP OF LOG-NORMAL DATA TO AIR QUALITY STANDARDS

A log-normal model of air pollutant data may be related to ambient air standards with a few simplifying assumptions. First, it is assumed that emissions are approximately constant during the year so that variations in air pollutant levels are primarily due to meteorology. Further, anthropogenic contributions to air pollution are predominant. Finally, the nature of the particular pollutant does not change as emissions are reduced (i.e. composition changes due to slower reaction kinetics, or the relative contribution of dust to total particulate matter). It follows that emission reduction will be accompanied by a proportional reduction in the geometric (and arithmetic) mean and that the geometric deviation will be essentially unchanged. On the other hand, a change in meteorology could change both the geometric mean and standard deviation. If S_g remains unchanged as emissions are reduced, equation 4 can be applied to the "lower" geometric mean to estimate the percent of the time which a given standard might be exceeded.

The above model has been applied to air pollutant data in San Diego County and found to approximate actual distributions for oxidant, carbon monoxide, and suspended particulate matter. Some of the details of relating the model to standards are given in the examples below.

*Interpreted to mean "that value to be exceeded once per year."

A.8.1 Oxidant

Under the log-normal model, the geometric mean is proportional to emissions (in this case precursors or emissions, assumed to be reactive hydrocarbons). The oxidant standard expresses only a maximum concentration not to be exceeded.* Intuitively, one would assume that rollback proportional to the ratio of the observed maximum concentration to the standard would be required. The model confirms this intuition by assuming that the geometric standard deviation does not change with emissions reduction. Equation (8) then shows that $C_{\max}$ values are proportional to the geometric means. It is not necessary to construct cumulative frequency distributions except to see if observed maximum values are approximately consistent with the rest of the data. A distribution is useful, however, in estimating oxidant reduction accompanying emission reduction. For instance:

A.8.2 Escondido 1972

Hourly maximum = 0.32 ppm (observed)

Geometric mean = 0.037 ppm

Geometric std. dev. = 1.65 ppm

Federal 1 hour std. = .08 ppm

Suppose oxidant forming hydrocarbons are reduced by 50%, resulting in a new oxidant distribution with $M_g = .0185$ and S_g unchanged at 1.65. Using $c_i = .08$ ppm in equation 4 and solving for z yields 2.94. This corresponds to 0.36%, or 31 of possible 8760 hours during the year would be expected to exceed the standard of .08 ppm. Over 12% of the hourly averages would be expected to exceed standards with the original 1972 distribution of oxidant values. This illustrates the non-linear nature of emission reduction-air quality relationship.

A.8.3 Carbon Monoxide

The federal standards for CO are based on two averaging times, 35 ppm for one hour and 9 ppm for an 8 hour average. If the one hour standard were to be met, a proportional reduction similar to that described for oxidant would be necessary. The 8 hour standard must be approached somewhat differently. If a distribution of 8 hour averages is not readily available, it may be estimated according to the method of Larsen. Briefly,

*Or to be exceeded once per year, depending on interpretation.

this method assumes that maximum values are proportional to averaging time raised to an exponent. Alternatively, the 8 hour distribution can be estimated from other time average distributions which are available. For this report, one hour and 24 hour distributions were available for 1972 (Fig. A-12). Interpolating between these distributions, $C_{\max}$ is estimated at 99.9% (the second highest 8 hour average). Both techniques yielded about 20 ppm as an 8 hour expected maximum value for downtown San Diego in 1972.

Although both the one hour and the 8 hour standards for CO are exceeded in downtown San Diego in 1972, emission reduction would have to be based on the 8 hour level rather than the one hour level since the former requires a greater rollback.

A.8.4 Suspended Particulate Matter

The federal standard involves both an annual geometric mean and a daily maximum value. Under the log-normal model, this standard would define a hypothetical distribution having an annual geometric mean of 75 micrograms per cubic meter and a geometric standard deviation of 1.68 (calculated assuming $C_{\max}$ to be 260 and that sampling is done on a 5 day cycle).

A station with an observed S_g less than 1.68 would simultaneously meet both standards by a reduction of the geometric mean. Applying equation (7) to El Cajon suspended particulate distribution, for instance:

A.8.5 El Cajon, 1972

$$M_g = 97 \quad S_g = 1.56 \quad C_{\max} = 288 \quad z = 2.45 \text{ for 70 samples/year}$$

Since $C_{\max} = M_g S_g^z$, a reduction of M_g from 97 to 75 (23%) would change $C_{\max}$ to 223.

$$C_{\max} = 75 (1.56)^{2.45} = 233$$

Thus the maximum standard of $260 M_g/M^3$ would also be met.

If a station has an S_g greater than 1.68, a rollback would have to be based on $C_{\max}$ rather than M_g in order for both standards to be met.

If natural background in this example were, say, 30 micrograms per cubic meter, ^{A-7} percent rollback from anthropogenic sources would be 33% rather than 23%. The higher the assumed background, the more severe the reduction from man made sources. C_{max} and S_g remain unaffected by this assumption unless the nature of suspended particulates changes.

A.8.6 Sulfur Dioxide

The federal standards for SO_2 involve both an annual average (.03 ppm) and a maximum 24 hour average (.14 ppm). These two standards would define a "hypothetical" log-normal distribution of daily average values. A "z" value for (1-1/365) would be taken from statistical tables and the arithmetic mean (m) converted to its geometric counterpart by solving equations 8 & 9.

$$M_g = \frac{m}{\exp (.051n^2 S_g)} \quad (8)$$

$$C_{max} = M_g S_g^z (1-1/n) \quad (9)$$

After calculation of the hypothetical M_g and S_g , a distribution of actual daily average SO_2 concentration is constructed for a given station and the actual M_g and S_g calculated. If the actual S_g is less than the hypothetical S_g then a reduction of the geometric mean to the standard will be accompanied by a corresponding reduction of the maximum expected value to below the standard. If S_g is greater than the hypothetical, then rollback reduction would have to be based on C_{max} as with suspended particulates. Equations 7 & 8 are only soluble by approximation methods and this procedure is omitted here since sulfur dioxide level are well below the standards in San Diego County. It

is pointed out, however, that the geometric and arithmetic means are proportional under the log-normal model and that either may be used to calculate rollback since S_g is assumed to be unchanged with reduced emissions (See Eq. 8).

If a 24 hour distribution is not available, it may be constructed from hourly data as discussed under carbon monoxide. Application of the 24 hour maximum or the yearly average to rollback would be dictated by the hypothetical S_g value compared to the observed value. (The suspended particulate standards present an analogous situation).

A.3.7 Nitrogen Dioxide

The federal standard for NO_2 sets a limit on the yearly average. In this case, a distribution of values need not be constructed. If NO_2 is assumed, however, to be log-normally distributed, equation 8 shows that geometric and arithmetic means are proportional (S_g remains constant). Rollback can then be calculated using the arithmetic mean. Implicit is the assumption that hydrocarbons and not oxides of nitrogen are limiting in the formation of oxidant.

Table A-1. Federal Ambient Air Quality Standards

Pollutant	Averaging Time	Federal Standards	
		Primary	Secondary
Photochemical Oxidants (Corrected for NO ₂)	1 hour	160 µg/m ³ (0.08 ppm)	Same as Primary Standard
Carbon Monoxide	12 hours	---	Same as Primary Standard
	8 hours	10 mg/m ³ (9 ppm)	
	1 hour	40 mg/m ³ (35 ppm)	
Nitrogen Dioxide	Annual Average	100 µg/m ³ (0.05 ppm)	Same as Primary Standard
	1 hour	---	---
Sulfur Dioxide	Annual Average	80 µg/m ³ (.03 ppm)	60 µg/m ³ (0.02 ppm)
	24 hours	365 µg/m ³ (0.14 ppm)	260 µg/m ³ (0.10 ppm)
	3 hours	---	1300 µg/m ³ (0.5 ppm)
	1 hour	---	---
Suspended Particulate Matter	Annual Geometric Mean	75 µg/m ³	60 µg/m ³
	24 hours	260 µg/m ³	150 µg/m ³

Table A-2. List of Air Monitoring Stations in
San Diego County

<u>Station</u>	<u>Address</u>	<u>Site Code</u>
Mission Valley	3703 Camino Del Rio	056820005 I01
El Cajon	110 E. Lexington	052220002 I01
Chula Vista - Fire Station	100 E. J. Street	051360001 I01
Escondido - Fire Station	100 E. Valley Pkwy.	052460001 I01
Oceanside	100 S. Cleveland	055320003 I01
San Diego	1111 Island Avenue	056800004 I01
San Diego - Public Library	8th and E. St.	056800001 A01
San Diego - Chollas Heights	581 Ryan Road	056800005 I01

Table A-3. Oxidant -- Annual Averages of Maximum Hourly Averages (in ppm) for San Diego County

STATION	1973	1972	1971	1970	1969	1963-69
San Diego Downtown	.06	.05	.04	.06	.07	.07
Mission Valley	N/A	.06 ¹	.06	.05	.06	.07
Oceanside	.07	.08	.07	.09	.11	.10
Chollas Heights	.08	.07	.07	.08	.09	.09
El Cajon	.07	.07	.09	.09	.10	.10
Nestor	N/A	N/A	.07	.07	.07	.08
Chula Vista	.07	.07	N/A			
Escondido	.07	.08 ²				

(1) January through August only
(2) May through December only

SOURCE: San Diego County APCD

Table A-4. Maximum Hourly Average Oxidant Concentrations for San Diego County (in ppm)

STATION	<u>OBSERVED</u>						2nd HIGHEST VALUE 1972	Omax	<u>CALCULATED</u>			1963-7 Omax
	1973	1972	1971	1970	1969				1972 M	S	g	
									g			
San Diego (downtown)	.24	.17	.16	.24	.22	--		.20	.02	1.90		.32
Mission Valley	N/A	.18	.21	.15	.21	--		.20	.03	1.70		N/A
Oceanside	.24	.24	.27	.40	.34	0.23		.21	.05	1.50		.50
Chollas Heights	.29	.26	.27	.25	.39	0.23		.26	.028	1.91		.33
El Cajon	.24	.22	.30	.26	.23	--		.22	.032	1.78		.37
Nestor	N/A	N/A	.24	.19	.19	0.21		N/A	N/A	N/A		.27
Chula Vista	.28	.29	N/A			0.27		.28	.03	1.83		N/A
Escondido	.32	.32	N/A			0.25		.26	.037	1.65		N/A

Table A-5. Carbon Monoxide - Average of Daily Maximum Hourly Averages for San Diego County (in ppm)

STATION	1973	1972	1971	1970	1969	1963-1967
San Diego (Downtown)	4	7	8	8	7	7
El Cajon	3	5 ¹	N/A			
Oceanside	3	N/A				

¹ May-December Only

Table A-6. Maximum Carbon Monoxide Values for San Diego County

STATION	Maximum Hourly Averages					
	1973	1972	1971	1970	1969	1963-67
San Diego (Public Library)	24	39 43 ²	27	21	32	45 46 (calculated) ²
El Cajon	15	12 ¹	N/A	-	-	-
Oceanside	12	N/A				

1 May - December Only

2 From log-normal plot

Table A-7. 1st & 2nd Maximum 8 Hour Averages for 1972 Carbon Monoxide (ppm)

	1973		1972		1971		1970	
	1st date	16 12/7	19 1/14	16 1/26	17 12/11	15 11/16		
San Diego (downtown)	2nd date	12 12/10	18 1/11	16 1/29				

Table A-8. Suspended Particulate Concentrations in San Diego County
Micrograms per cubic meter

STATION	Annual Geometric Means						
	1973	1972	1971	1970	1969	1968	1963-1967
San Diego (HASN)	N/A	59	52	87	73	62	71
San Diego (downtown)	82	79	72	87	74		
El Cajon	104	97	91	85	82		

Table A-9. Maximum Suspended Particulate Concentrations
(Micrograms per Cubic Meter)

	Observed							Calculated Cmax 1972	
	1973	1972	1971	1970	1969	1968	1963-37	Maximum	Sg
San Diego (HASN)	N/A	140	116	215	204	N/A	N/A	150	1.51
San Diego (downtown)	253	214	138	215	118		282	186	1.42
El Cajon	208	285	210	163	147		N/A	288	1.56

Table A-10. Sulfur Dioxide Concentrations in San Diego County.

STATION	Highest One Hour Average (PPM)		1972 Yearly Average (PPM)
	1973	1972	
San Diego	.05	.06	.003
El Cajon	.07	.04	.005

Table A-11. Nitrogen Dioxide Concentrations in San Diego County

Average of Daily Maximum Hourly Averages

STATION	1973	1972	1971	1970	1969	1972 Yearly Averages
San Diego (downtown)	.06	.06	.07	.04	.04	.031
Mission Valley	N/A	.08	.08	.05	.07	.040
El Cajon	.04	.06				.032
Oceanside	.05					

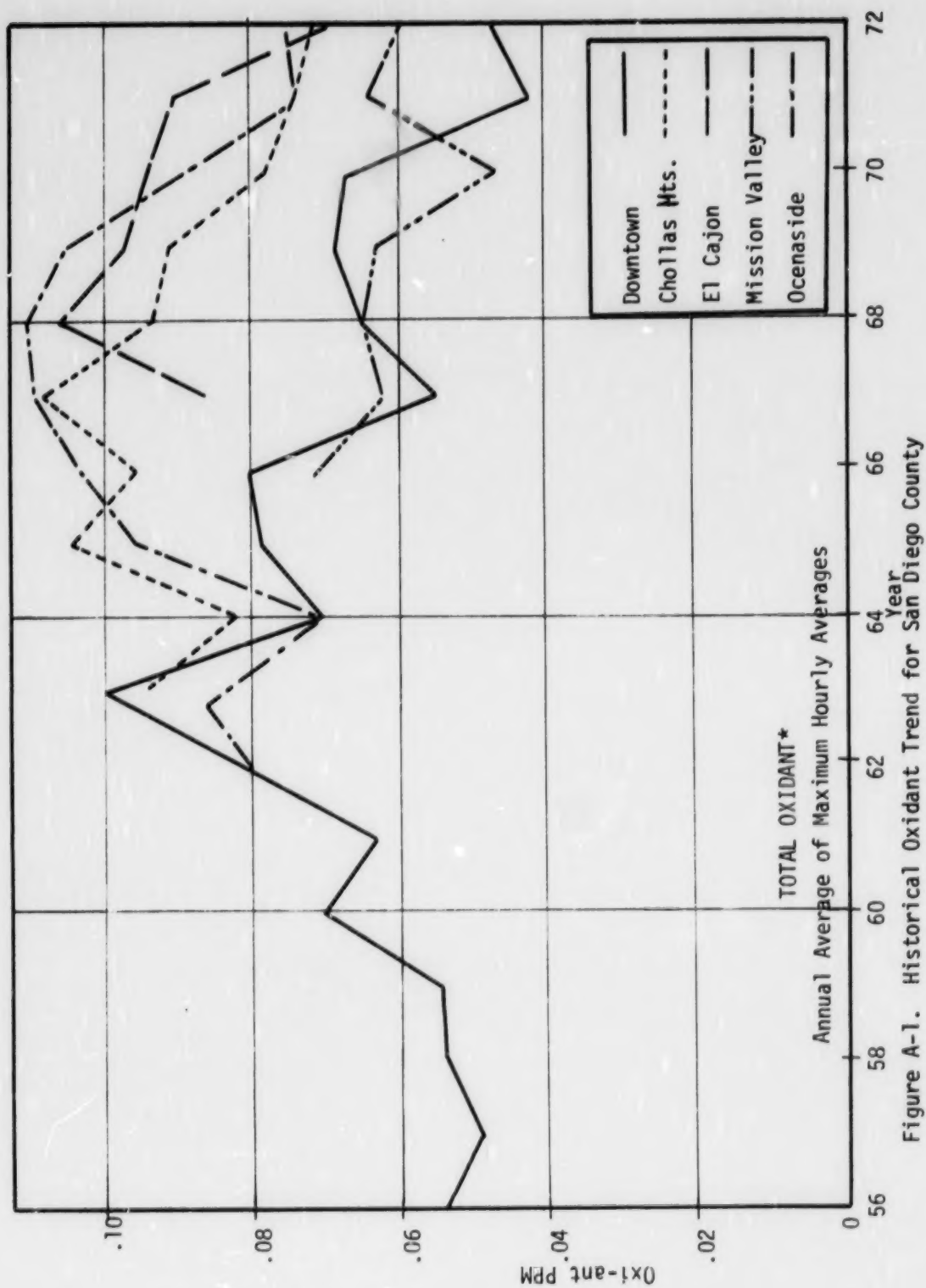


Figure A-1. Historical Oxidant Trend for San Diego County

Source: San Diego County APCD

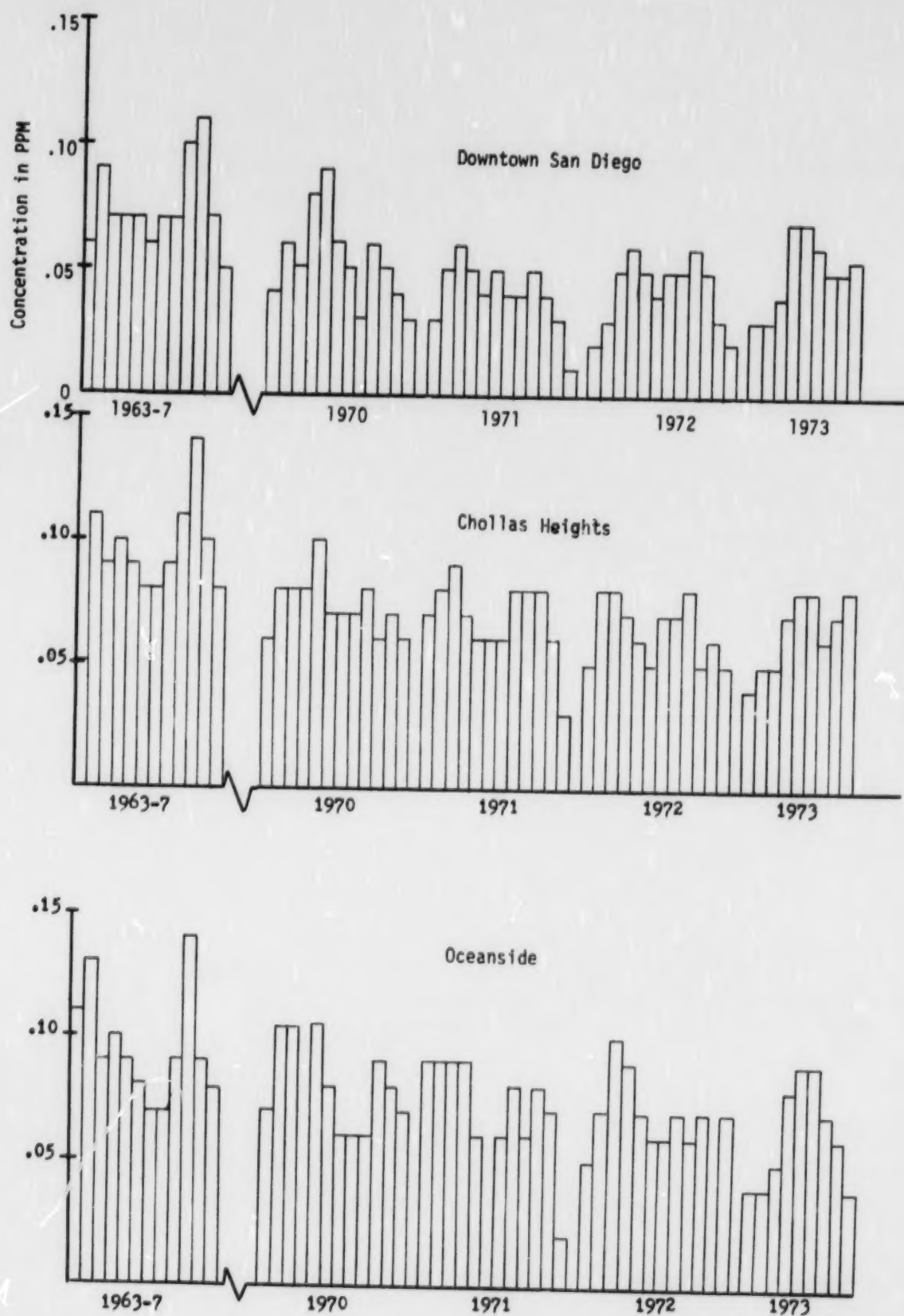


Figure A-2. Seasonal Trend for Oxidant
(Average of Daily Maximum Hourly Averages
by Month)

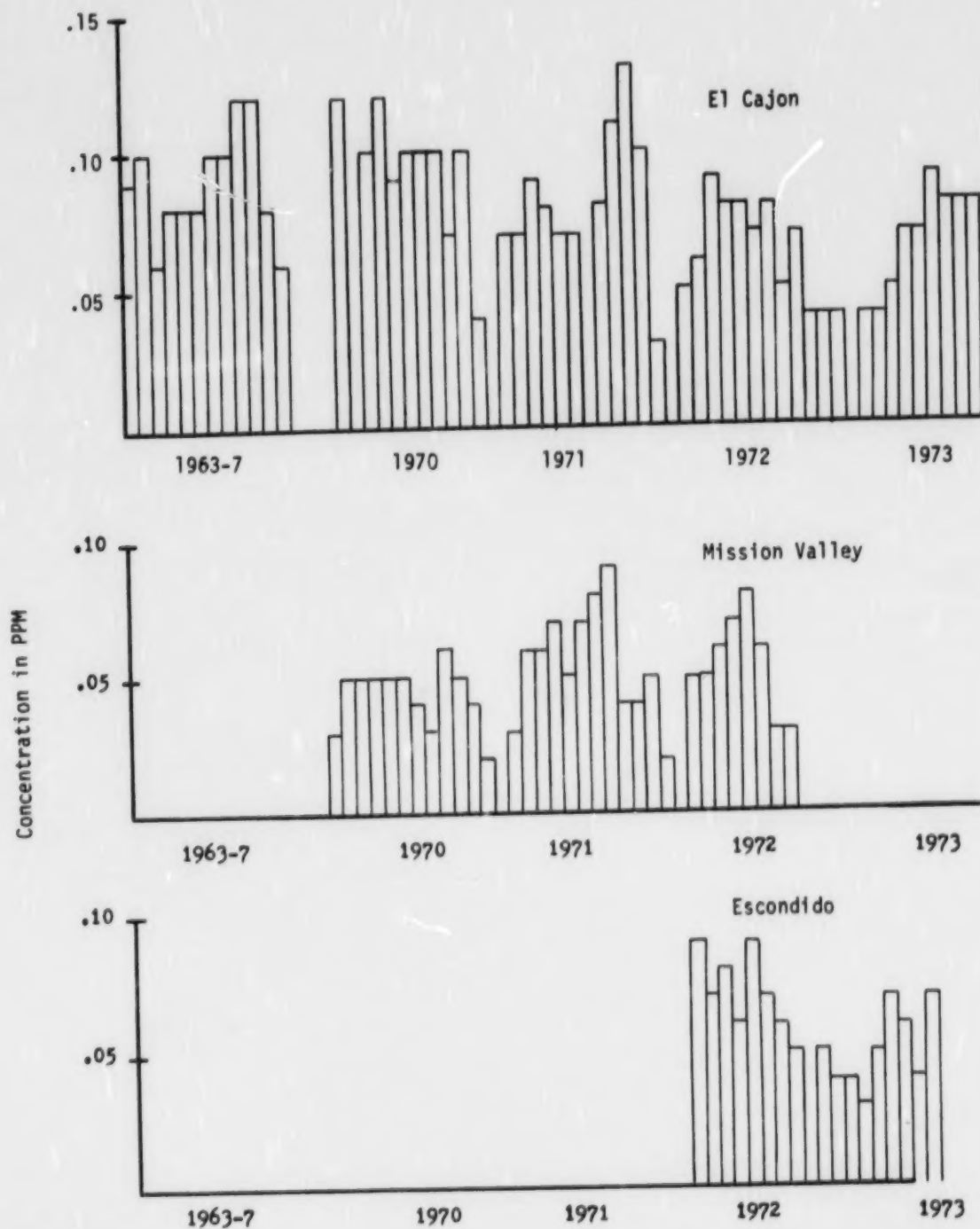


Figure A-2. Seasonal Trend for Oxidant (Average of Daily Maximum Hourly Averages by Month) (Continued)

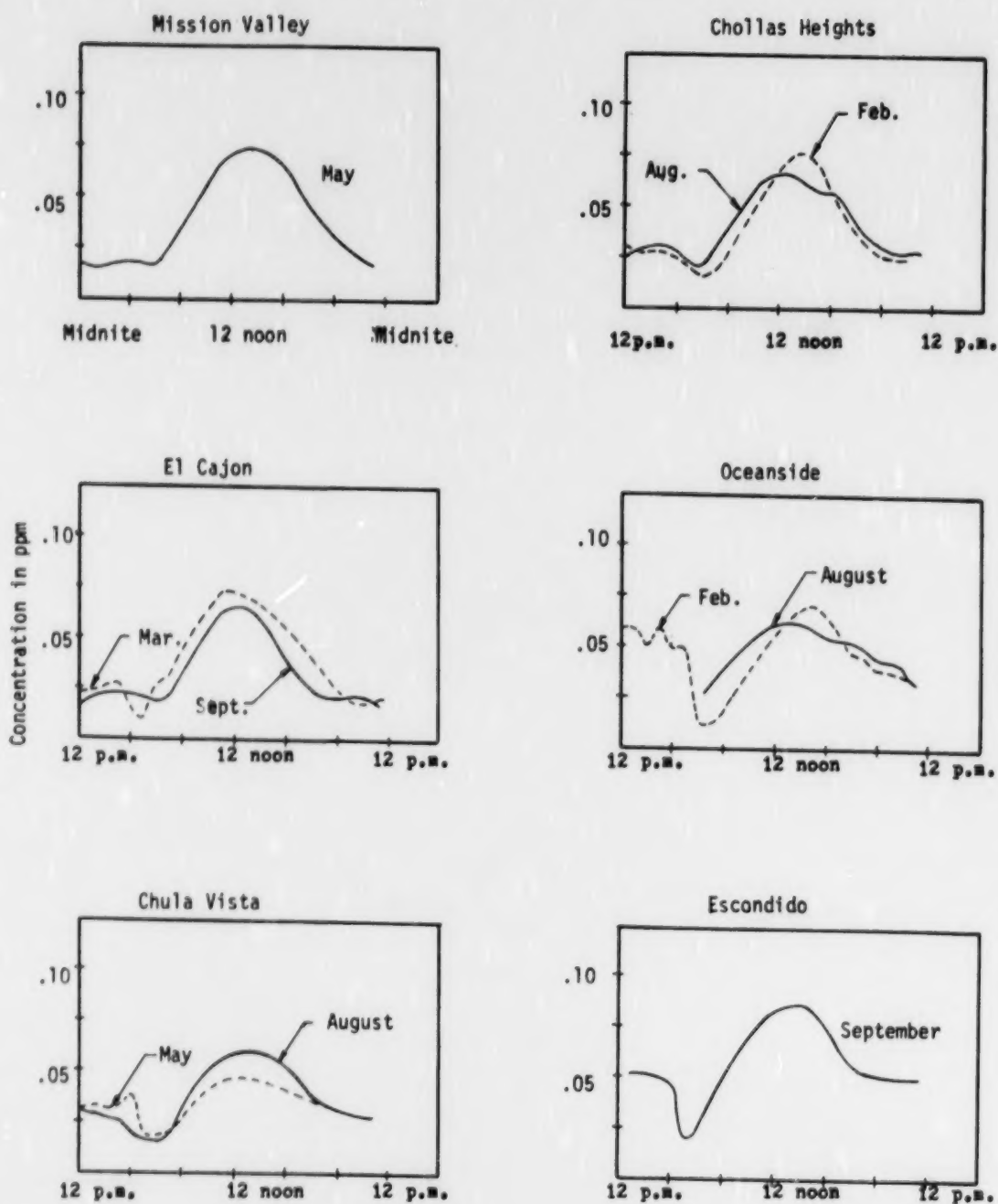


Figure A-3. Diurnal Pattern for Oxidant (Monthly Average of Oxidant Values by Hour of the Day)

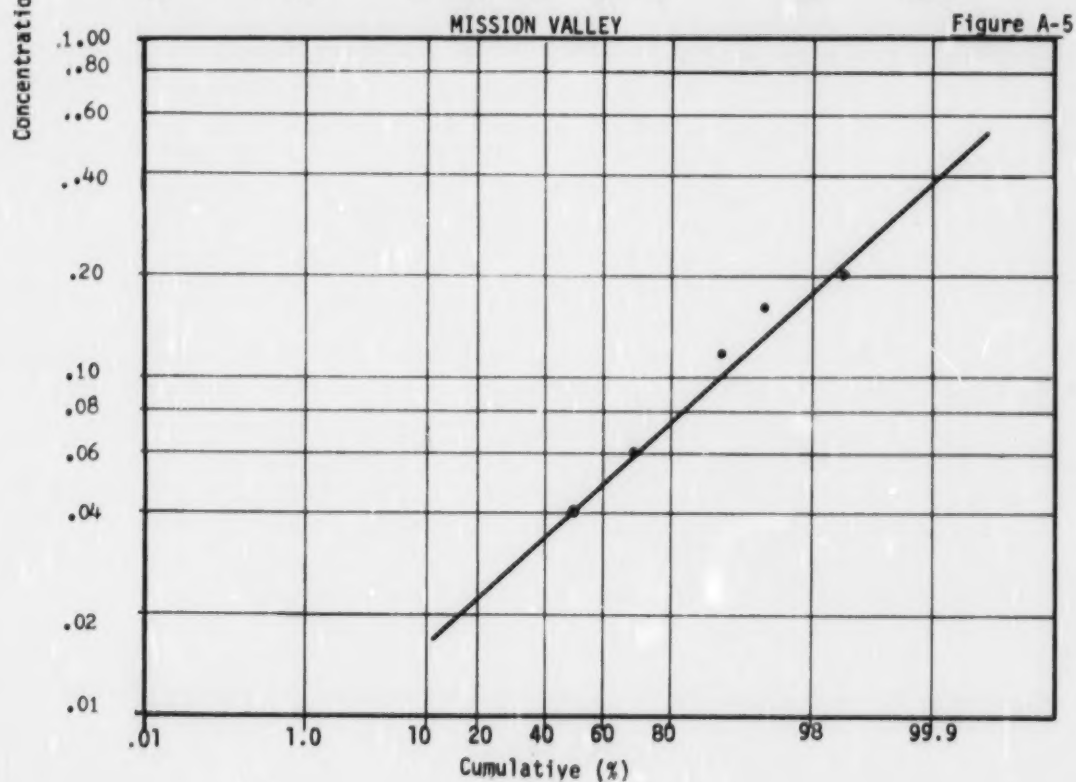
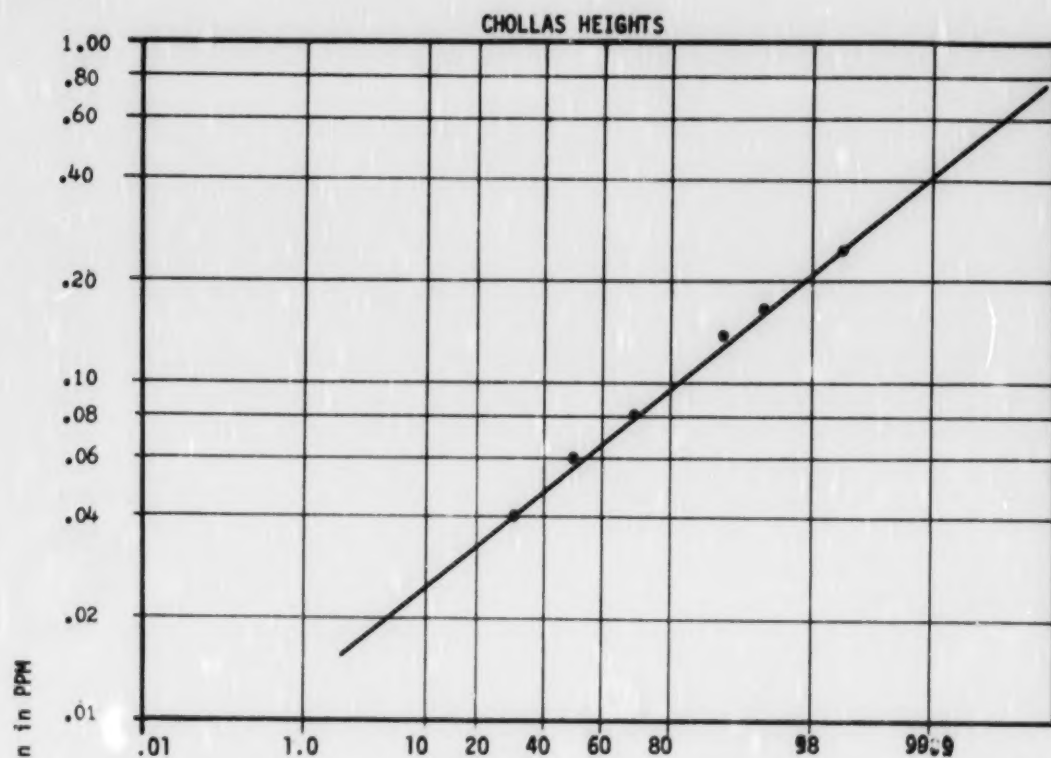


Figure A-4. Cumulative Frequency Distribution for Oxidant

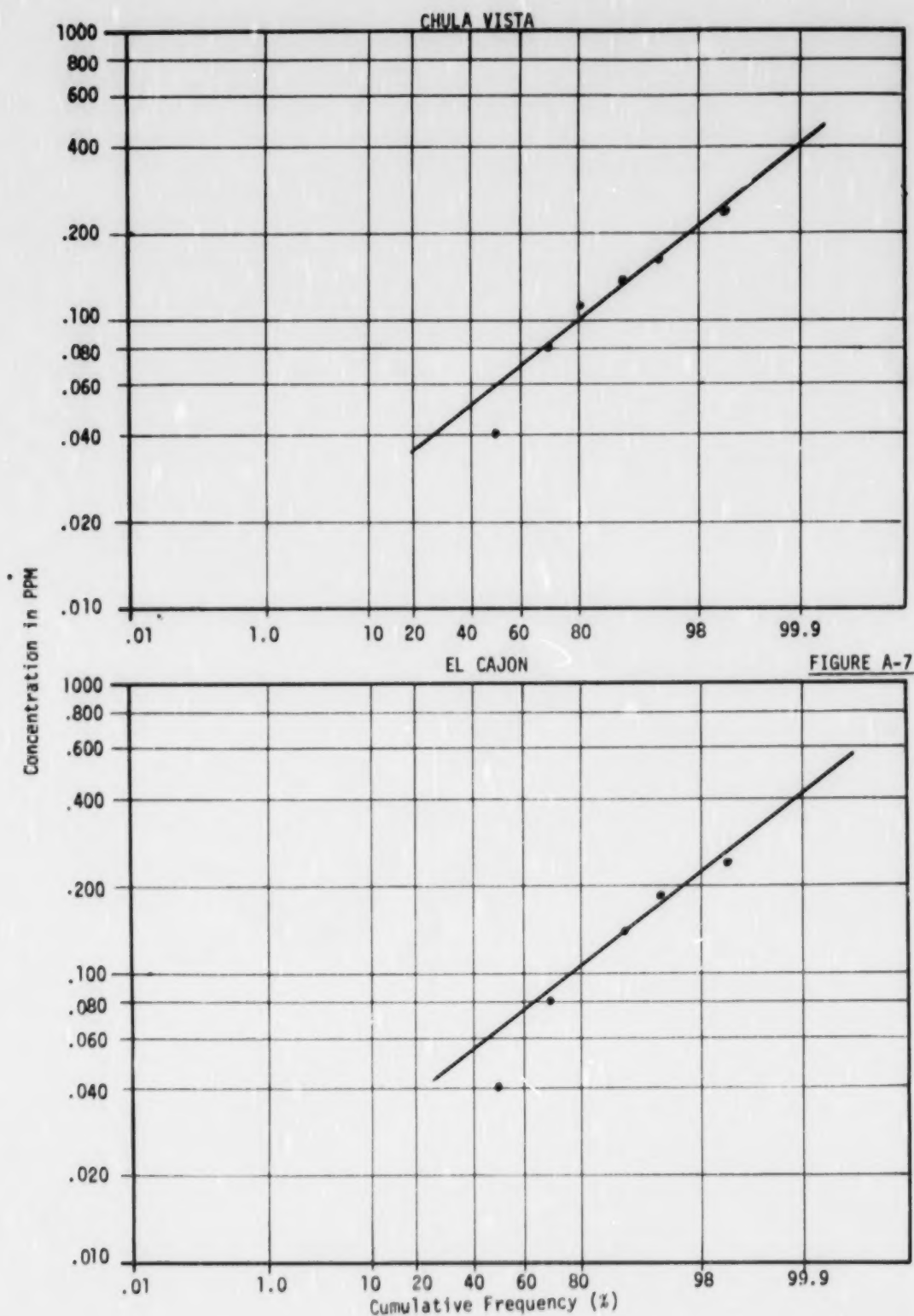
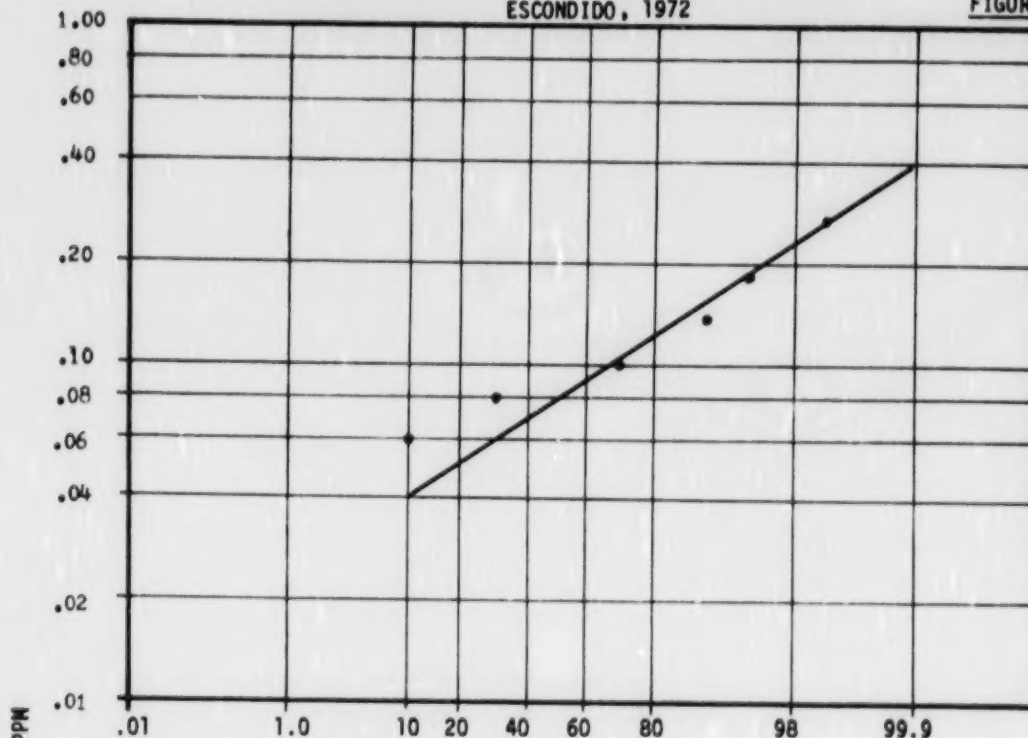


Figure A-6. Cumulative Frequency Distribution for Oxidant

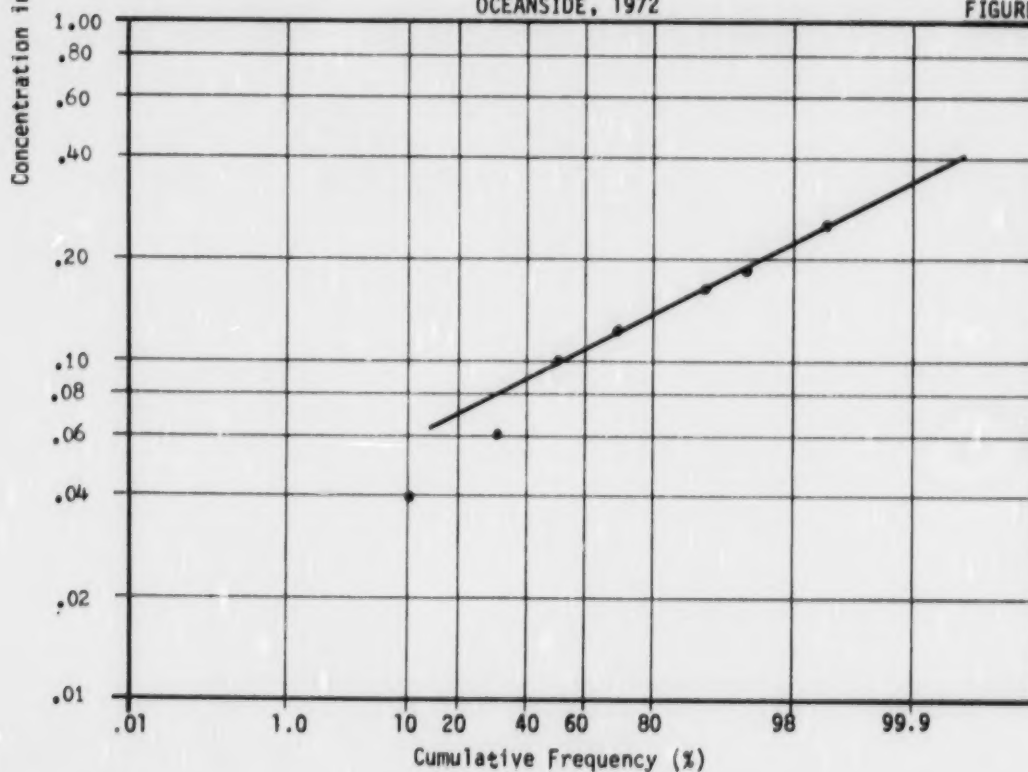
CUMULATIVE FREQUENCY DISTRIBUTION FOR OXIDANT
ESCONDIDO, 1972

FIGURE A-8



OCEANSIDE, 1972

FIGURE A-9



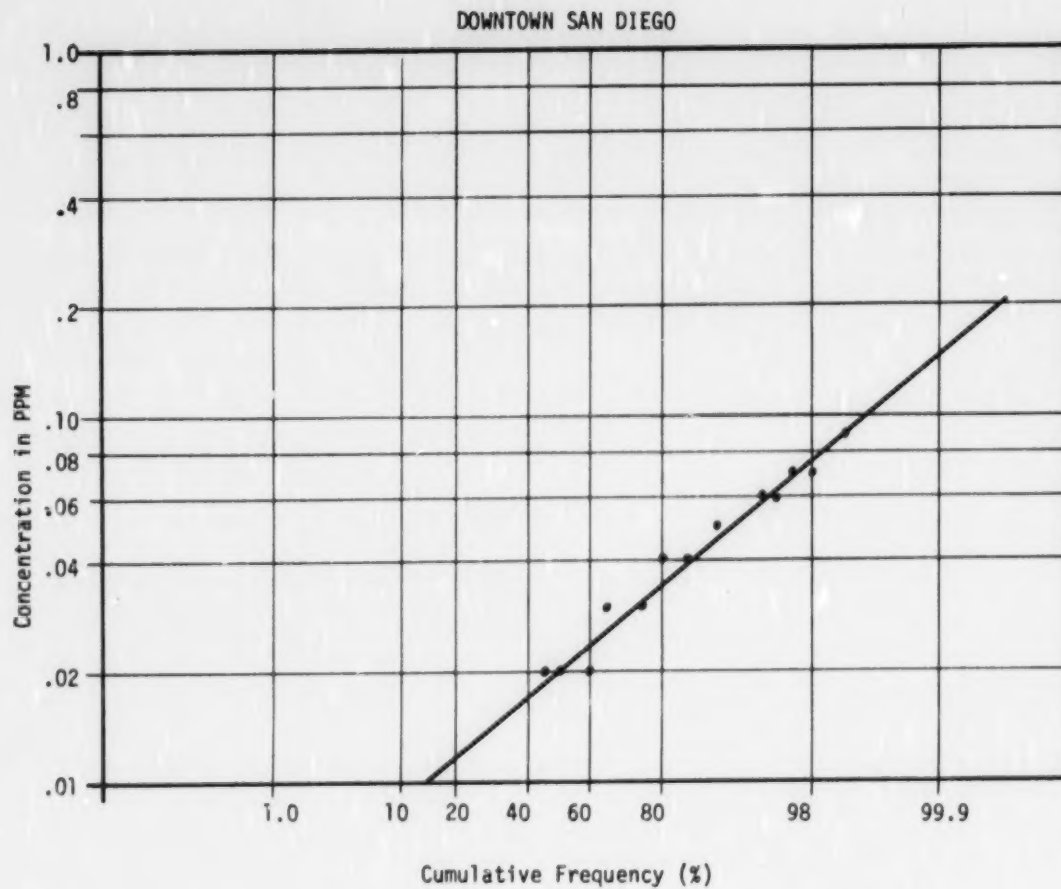


Figure A-10. Cumulative Frequency Distribution for Oxidant

AVERAGES OF MAXIMUM HOURLY AVERAGES BY MONTH

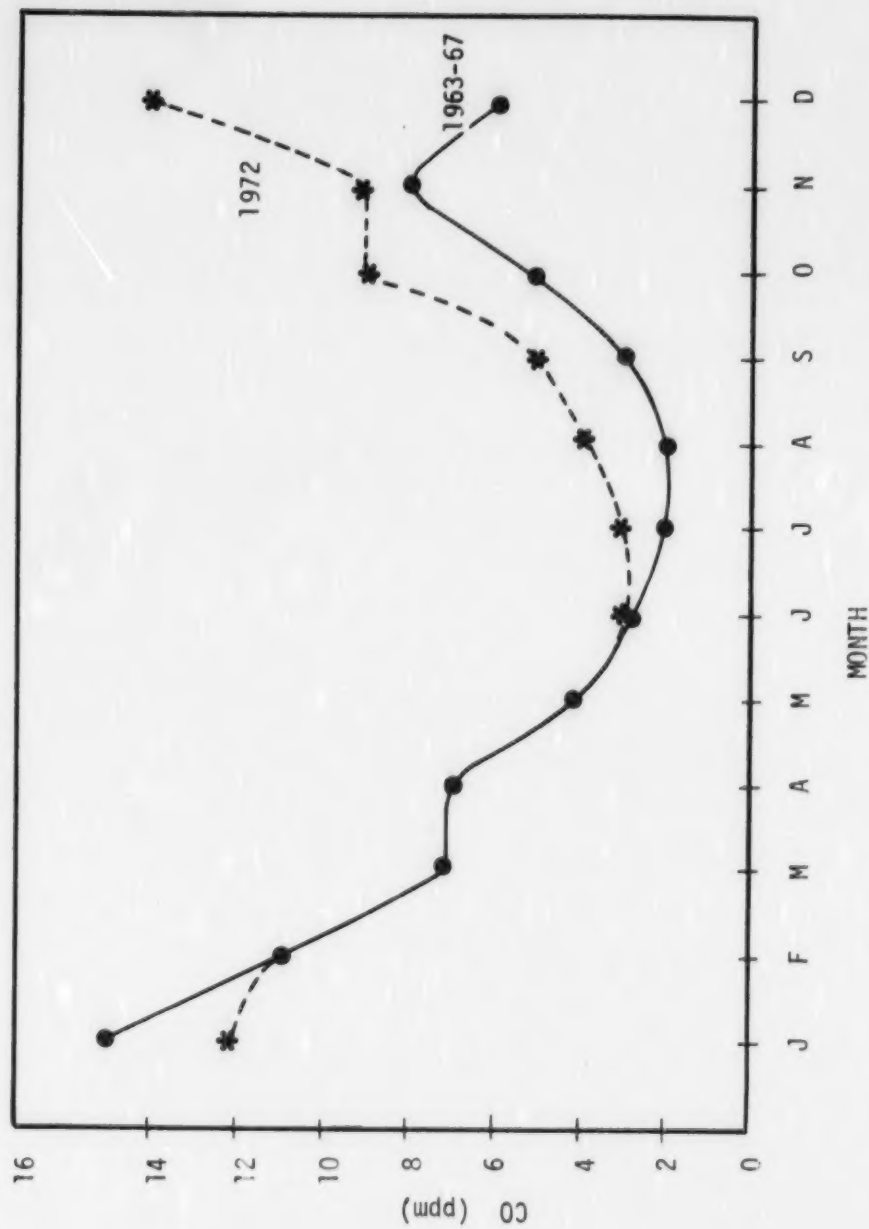
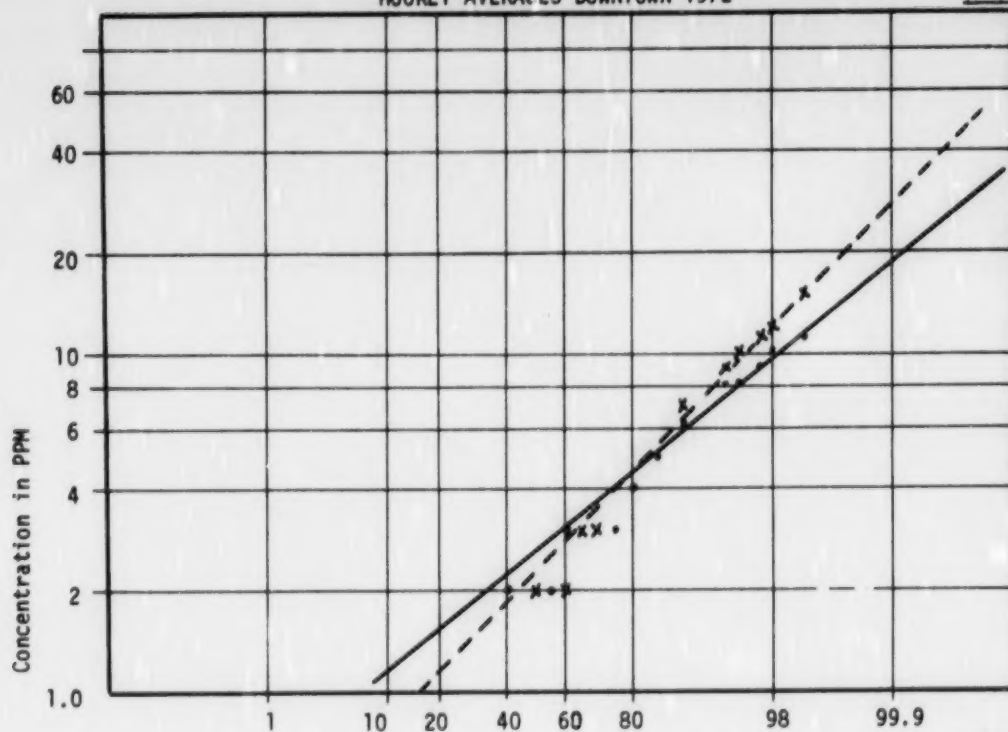


Figure A-11. Carbon Monoxide Seasonal Variation (Downtown San Diego), 1972

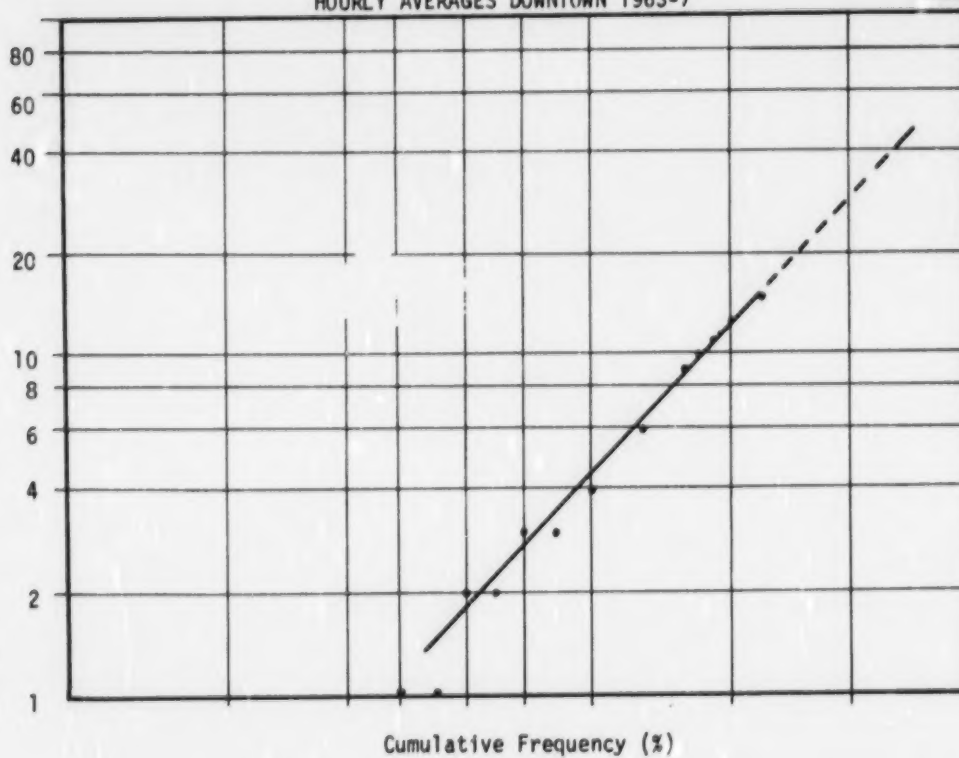
CUMULATIVE FREQUENCY DISTRIBUTION FOR CARBON MONOXIDE
HOURLY AVERAGES DOWNTOWN 1972

FIGURE A-12



HOURLY AVERAGES DOWNTOWN 1963-7

FIGURE A-13



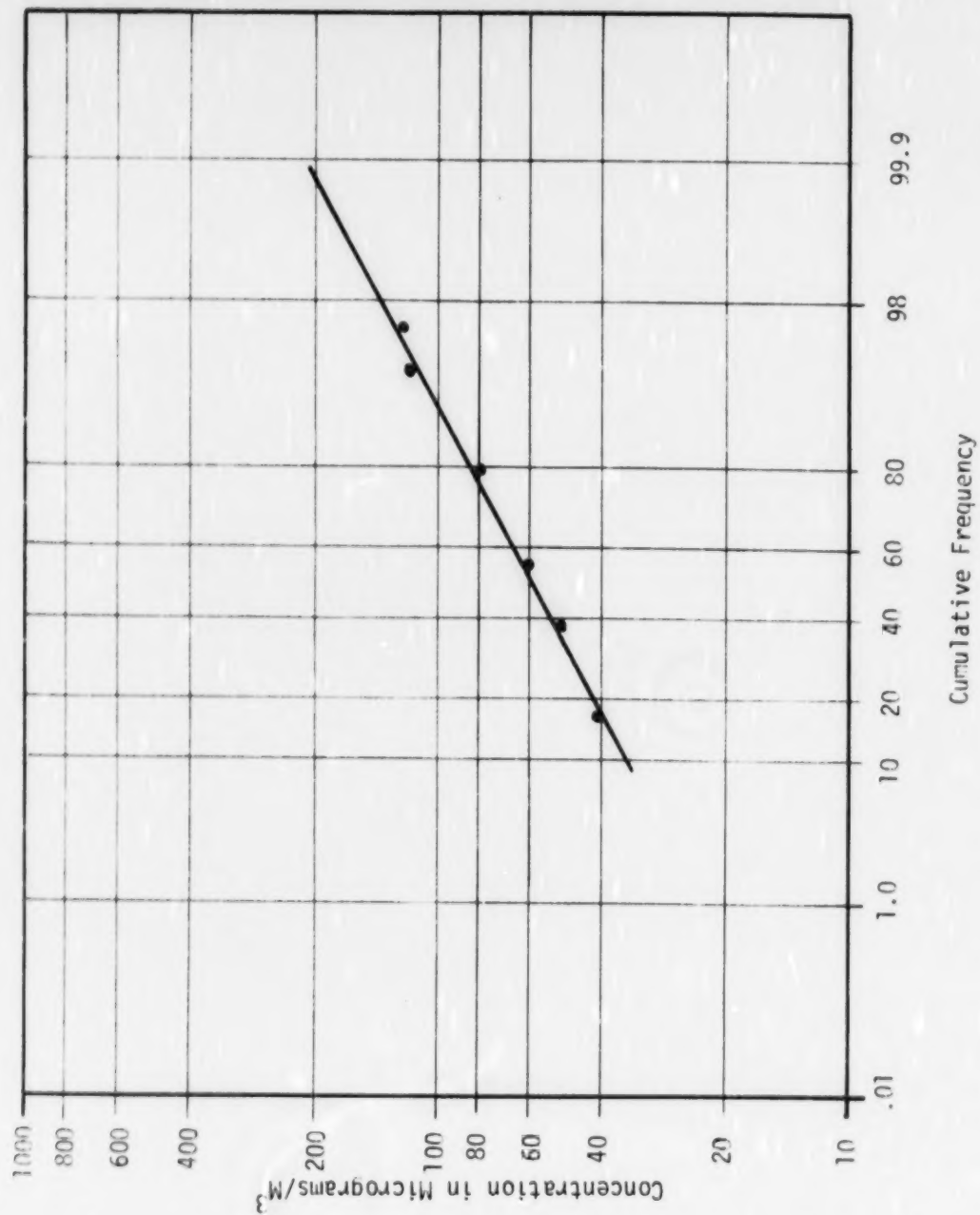


Figure A-14. Cumulative Frequency Distribution for Suspended Particulates
(Downtown San Diego, NASN)

DOWNTOWN SAN DIEGO (HASH)

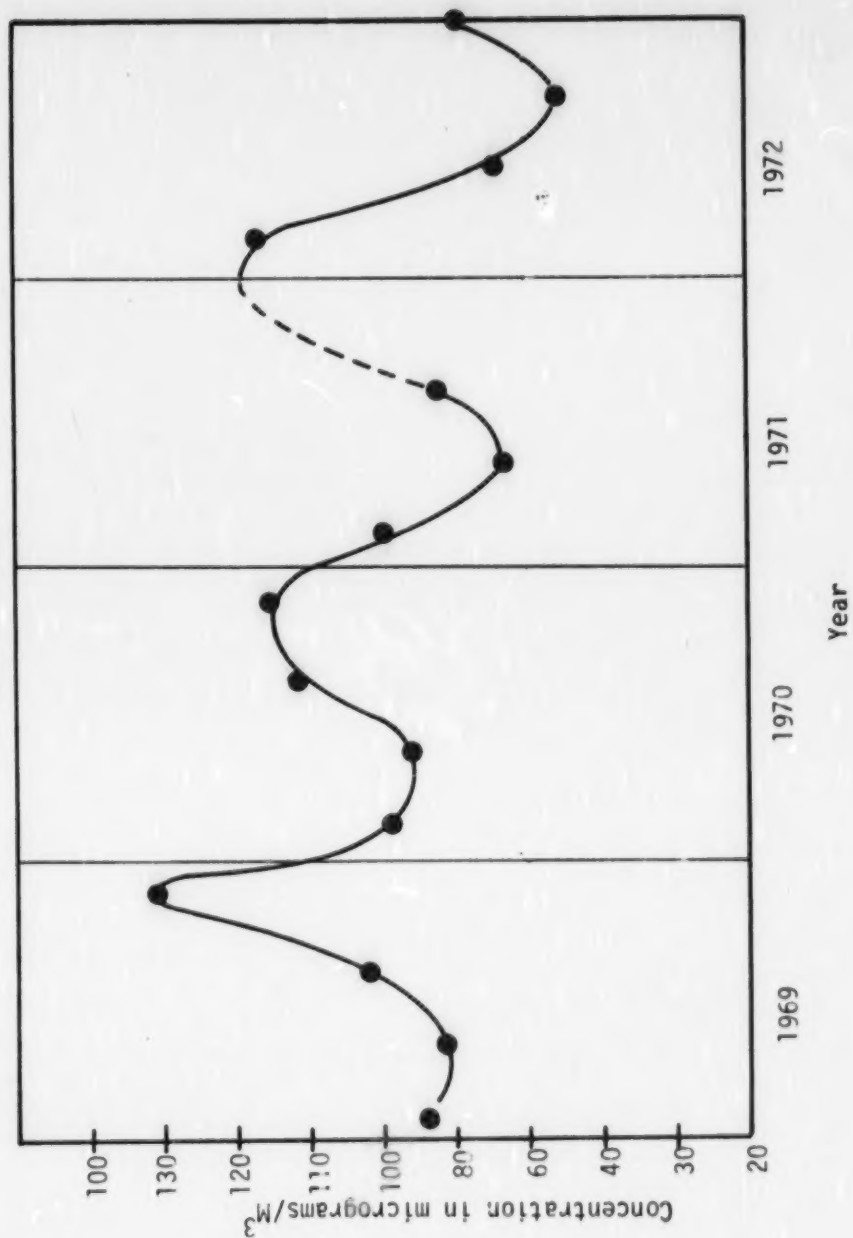


Figure A-15. Seasonal Trend for Suspended Particulate Matter (Quarterly Geometric Means)

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- A-1. "Air Quality Monitoring Station Siting Study for the San Diego County Air Pollution Control District," Pacific Environmental Services, Inc., March, 1974.
- A-2. TRW, Inc., "Air Quality Implementation Plan Development for Critical California Regions: Summary Report," Transportation & Environmental Operations of TRW, Inc., Report for EPA.
- A-3. California Air Resources Board, Quarterly Report, December, 1972.
- A-4. Larsen, R. I., "A Mathematical Model for Relating Air Quality Measurements to Air Quality Standards," U. S. Environmental Protection Agency, Pub #AP-89, November, 1971.
- A-5. Larsen, R. I. et al., "A Method for Calculating Precursor Reduction Needed to Achieve an Oxidant Air Quality Standard, EPA Preliminary Draft, August, 1972.
- A-6. Goeller, Bruce, et al., San Diego Clean Air Project Summary Report R-1362-SD, Rand Corp., Santa Monica, California, December, 1973.
- A-7. "Proposed Amendments to State of California Implementation Plan for Achieving and Maintaining National Ambient Air Quality Standards," California Air Resources Board Support Document, June 13, 1974.

APPENDIX B-SAN DIEGO POPULATION DATA

The population data base is of primary importance in air quality planning. This is particularly true in areas of rapid population growth such as San Diego is currently experiencing. Three estimates of population growth for San Diego County are presented in Table B-1. The estimate chosen for use in this report is that of the San Diego Comprehensive Planning Organization (CPO) which projects an approximate 2.3% annual growth, with some leveling off toward the year 2000. A brief discussion of the three projections and reasons for the choice of CPO estimate is given below.

The Bureau of Economic Analysis of the U.S. Department of Commerce (DOC) has made population projections for Standard Metropolitan Statistical Areas (SMSA).^{B-1} For San Diego, the SMSA is equivalent to the county area. The "C" or middle series natural population increase, i.e. births minus deaths, is shown in Figure B-1. Migration is estimated for SMSA's by assuming that economic opportunity is the determining factor. In areas with a large number of retired persons, such as San Diego, this population segment is included separately in the calculations. Other assumptions include a trend toward geographic homogeneity in employment and other social and economic variables, along with continued per capita income growth and per man hour output resulting from technological progress. Also, possible catastrophic events (such as war, ecological disaster, etc.) are not considered. The fertility rate nationally is assumed to approach 2,787/1000 women in the year 2000 under series "C" projections. San Diego County shows an expected overall growth rate of 1.59% annually, compared to the national average growth rate of 1.36%.

The population research unit of the California Department of Finance (DIF) makes population estimates and projections for cities and counties in the state, mainly for purposes of tax revenue distribution (i.e., gasoline tax).^{B-2} Six different population estimation techniques are used, with the "certified" estimate being an average of the six. Three of these methods add migration to natural increases, using changes in school enrollment by age group to gauge migration. Empirical equations are extrapolated to obtain population projections for a given area. A fourth method uses historical ratios of various indices between the

county and the state. Variables which are included are births, deaths, school enrollment, employment, income taxes, and auto and voter registration. Again, empirical relations are extrapolated to obtain future population estimates. A fifth technique uses residential electric customers as a guide to changes in occupied housing units. Combining this data with "average" household size and estimates of persons not in housing units, area populations are calculated. In the sixth and last method, separate estimates of population of age groups are summed to a total population. Examples of estimating methods for different age brackets are school enrollment (for ages 5-7) and social security recipients (for ages 65 and over). The six separate estimates by counties are averaged to yield a final result. Although several series of projections are made using different fertility and migration rates into the state, Series D-100^{B-4} (including a constant 97,400 military population), was chosen as a mid-range and most probable projection. Also shown is Series E-0, which assumes a fertility rate of 2.11 births/woman and no migration into the state through the year 2000.

The San Diego County CPO has developed the Cohort Survival Method for estimating future population.^{B-3} Briefly, the method divides the population into 5-year age groups, advancing each group by five year intervals (corrected for survival rate). Adding birth and death figures yields the total natural change in population. Migration estimates related to employment are then added to each age group. Finally, forecasts of retirement migration to San Diego County are made and added to the total. The resulting population forecast is given for five year periods.

Graph B-1 shows that a range of 6% and 17% difference occurs between estimates from the three sources for the years 1975 and 2000 respectively. Note that all sources use 1970 census population for San Diego County. The contrast between the mid-range DOC and the state and county estimates is particularly large. Detailed calculations behind the estimates were not investigated, but it seems likely that the DOC projections are less "fine tuned" to local factors than the other projections. Note that even the "no migration" series E-0 of DOC is higher than the federal estimate. For this reason and the fact that the CPO and D-100 series projections are close together, emphasis in this report will be placed on CPO estimates.

The relatively rapid growth rate for San Diego County compared to the nation as a whole (2.3% annual v. 1.36%) indicates that the County will double in population between 1970 and 2000.

As with all estimates of future population, the CPO projection is likely to be more accurate for the near term than the longer term. It is also necessary to point out the inability to accurately forecast effects of changing economic and social factors which might dramatically change absolute population and its distribution (i.e., energy related constraints on transportation). For the time frame of this report, however, differences in population projections will not have a dramatic effect on measures required to maintain air quality.

Table B-1. Population Projections for San Diego County
(in Millions of Persons)

SOURCE	1970	1975	1980	1985	1990	1995	2000
U.S. Dept. of Commerce series C	1.358 ¹	1.475	1.596	1.741	1.901	N/A	2.186
California State Dept. of Finance	1.358 ¹		1.650		1.955		2.11
E-0	1.358 ¹	1.573	1.801	2.022	2.242	2.450	2.654
D-100							
San Diego Comprehen- sive Plann- ing Organ- ization	1.358 ¹	1.544	1.744	2.021	2.287	2.450	2.552

¹ 1970 Census Data for San Diego County

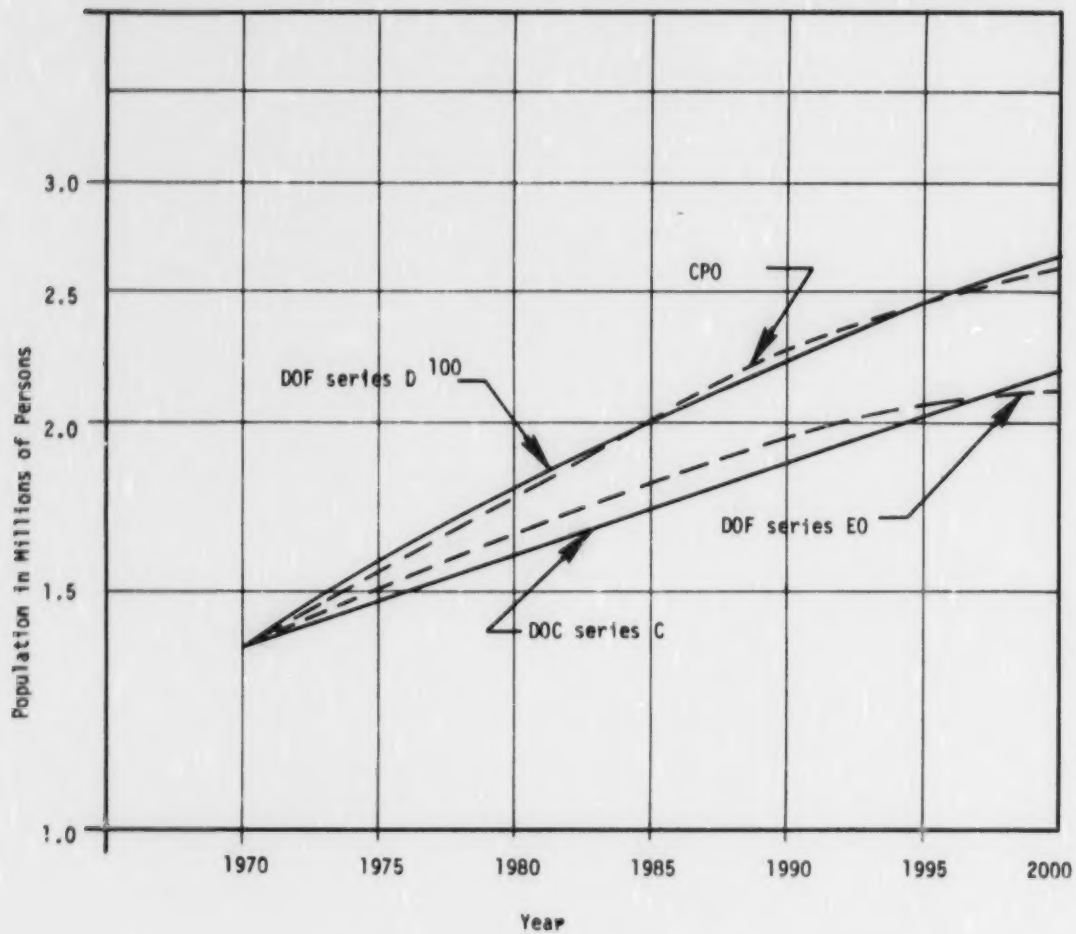


Figure B-1. Population Projections for San Diego County

REFERENCES

- B-1. "Population and Economic Activity in the United States and Standard Metropolitan Statistical Areas", U.S. Environmental Protection Agency, July, 1972.
- B-2. "California Population, 1971", California State Dept. of Finance, May, 1972.
- B-3. "Technical Users Manual for Interactive Population/Employment Forecasting Model" San Diego County Comprehensive Planning Organization, June, 1972.
- B-4. "Provisional Projections of California Counties to 2000," Population Research Unit, California State Department of Finance, Report 74P-1, January 10, 1974.

APPENDIX C - NEDS Update

The National Emissions Data System (NEDS) was conceived to be an extremely detailed emissions inventory of each air quality control region (AQCR) which would provide information concerning stationary sources emitting greater than 100 tons per year of any pollutant. Among the data included in the NEDS for a given source would be:

- a description by Standard Industrial Code (SIC) and Source Classification Code (SCC).
- magnitude of emissions in tons/year.
- frequency and duration of operation in terms of hours/day, days/week and months/year.
- type of control equipment and their estimated efficiencies.
- location by Universal Transverse Mercator (UTM) zone and coordinates (see C-1, C-2, C-3 and C-4 for a detailed description of the UTM system).

All data would be stored in computers to facilitate rapid retrieval. The inventories could be updated from year to year such that trends may be extrapolated.

The purpose of this task was to update the most current NEDS (1970) inventory for the San Diego AQCR to the year 1972. Unfortunately, the 1970 NEDS inventory was in many aspects useless for this task. In the first place, roughly only 20% of the reportable sources (those with emissions of greater than 100 tons/year of any pollutant) in 1970 had been coded (C-5). Secondly, many of the sources reported in 1970 had either (a) changed ownerships and thus names (b) moved to a new location or (c) emitted less than 100 tons/year in 1972 and thus had to be eliminated. Thirdly, many new reportable sources appeared in 1972. For all practical purposes, the 1970 NEDS inventory was not utilized at all. The data used in compiling a 1972 inventory in the NEDS format was obtained from the San Diego County APCD. Only point sources were included in the inventory (the NEDS inventory is devised to include both point and area stationary sources).

Because of time and manpower constraints, all the information normally reported for a source was not included.

Specifically, information recorded in this task were:

- State, county, AQCR and plant ID number codes.
- City code (when available), UTM zone, UTM coordinates, establishment name and address, personal contact at the source (when available) and ownership (local, state or federal government, private, utility).
- Point ID number, year of record, SIC code, IPP process code (when applicable), stack data (when applicable and available).
- Boiler design capacity (when applicable and available).
- Emission estimates and estimation method (when available).
- SCC code, fuel process operating and maximum design rate (when applicable and available), comments, source and confidentiality codes.

For the purposes of the project, three additional sets of information not normally required by the NEDS inventory were reported:

- State plane coordinates of the location of the source (see C-2 for an explanation of this coordinate system).
- Percent of total hydrocarbons emitted (if any) which are reactive.
- Point sources emitting between 1 and 100 tons/year of any pollutant. This was done because where stationary source control programs are in effect in an area, a majority of the sources will emit less than 100 tons/year. If these sources were omitted from the inventory, a substantial quantity of pollutants would remain unreported.

Two difficulties were encountered in compiling the NEDS inventory. The primary difficulty involved locating the sources on a U.S. Geological Survey Map for UTM coordinates and San Diego County Cartographic Service Maps for state plane coordinates. Often times, the addresses were vague, imprecise or gave a post office box number. This difficulty was resolved by conversations with Louthen of the San Diego County APCD (C-7), who is familiar with the location of all the sources in question. The second problem involved the coding of a source which emitted only one ton/year of a pollutant, but had three or more boilers producing this pollutant. The NEDS instructions are that every boiler is coded as a new source, and if one figure is reported for all the boilers, the emissions are proportioned according to the size of the boilers. In the case of three or more boilers of equal size emitting a total of one ton/year, each boiler emits less than 0.33 tons/year. Because of round-off problems, all

sources emitting less than 0.5 tons/year are automatically assigned zero emissions. Thus, the three or more boilers would be excluded from the inventory. The decision was made to forego the NEDS instructions in this situation and to code all the boilers as one single source.

REFERENCES

- C-1 Grids and Grid Reference. Department of the Army. Washington, D.C. Publication No. TM5-241-1, June, 1967.
- C-2 Deetz, C.H. and Adams, D.S., Elements of Map Projection, U.S. Department of Commerce. Washington, D.C., Spec. Publication No. 68, 1945.
- C-3 Universal Transverse Mercator Grid, U.S. Department of the Army, Washington, D.C., Publication No. TM5-241-8, July, 1968.
- C-4 Universal Transverse Mercator Grid, Zone to Zone Transformation Tables, U.S. Department of the Army, Washington D.C., Publication No. TM5-241-2, June, 1957.
- C-5 San Diego APCD, private communication, May, 1974.
- C-6 Guide for Compiling a Comprehensive Emission Inventory (revised). EPA, Office of Air and Water Programs, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina, March, 1973
- C-7 W. Louthen, San Diego County APCD, private communication, May, 1974.

APPENDIX D - DELPHI PANEL MEMBERS AND RESULTS

As part of the effort to create a pilot air quality maintenance plan (AQMP) for San Diego, a Delphi Panel session was held on June 10, 1974, in San Diego, to obtain local "expert" opinions of candidate land use measures for air quality maintenance. Approximately two weeks before the session, invitations to attend were extended to twenty eight members of various local city and county planning agencies, business groups, various regional planning agencies and others. The criteria for selecting panel members were:

- 1) Knowledge of the issues in land use decisions or air quality.
- 2) Represented an agency or government arm that had a policy making or policy-influencing role in land use matters, e.g. the Air Resources Board.
- 3) Represented business or citizen interests that would be affected by any of the major land use control measures.
- 4) Represented companies or agencies which would play a role (directly or indirectly) in the successful implementation of an AQMP, e.g. San Diego Transit Company.

The composition of the panel by no means purports to be completely representative of all the interest groups in San Diego.

Twenty-five persons agreed to participate and were sent letters of confirmation one week before the session (see Table D-1). Of these, fifteen actually attended the panel session, five sent representatives or more qualified persons and the remaining were unable to attend due to conflicts in scheduling. In addition, during the course of the session, five members left to attend to other previously scheduled commitments resulting in fourteen persons who were able to participate in all the rounds of the questionnaire survey. The list of attendees is shown in Table D-2.

The Delphi Panel was scheduled for 1:00 pm in the conference room facilities of the Comprehensive Planning Organization. The session ran approximately three and one-half hours with breaks between rounds (except for the first two) during which the previous round's results were tabulated for presentation in the next round. A total of seven rounds were utilized in the Delphi questionnaire to judge overall attractiveness, implementability and effectiveness of candidate control measures.

Following Table D-2 is the actual Delphi questionnaire which was used and the results of the session (Table D-3).

Table D.1 - List of People Who were Notified
of the Delphi Panel

Mr. Michael Bedaux
Planning Director
704 Third Street
Oceanside, California 92054

Mr. Richard Brown
County Board of Supervisors
1600 Pacific Highway
Room 335
San Diego, California 92101

Mr. Grant Burns
Director of Planning
Planning Department
8130 Allison Street
La Mesa, California

Mr. Darrell Daugherty
Planning Director
100 Valley Street
Escondido, California 92025

Mr. William Dotson
Department of Transportation
P.O. Box 8146
San Diego, California 92138

Mr. Thomas E. Firlle
Environmental Management Coordinator
San Diego Unified Port District
3165 Pacific Highway
San Diego, California 92112

Mr. James Goff
Planning Director
City Administration Building
Community Concourse
San Diego, California 92101

Lee Grissom
Chamber of Commerce, San Diego
233 "A" Street
Suite 300
San Diego, California

Mr. Scott Harvey
Legislative Director
Building Contractor's Association
P.O. Box 20006
San Diego, California 92120

Mr. Daniel Gorfain
Assistant Director & Chief Planner
6154 Mission Gorge Road
Suite 220
San Diego, California 92120

Stuart Shaffer
Comprehensive Planning Organization
Suite 524
1200 Third Avenue
San Diego, California 92101

Mr. Evan Jones
Ace Auto Parks,
1111 Seventh Avenue
San Diego, California 92101

Mr. Art Letter
Comprehensive Planning Organization
Suite 524
1200 Third Avenue
San Diego, California 92101

Mr. Daniel Lieberman
Air Resources Board
1709 Eleventh Street
Sacramento, California 95814

Mr. Herman Rosenthal
Director, Land Use Programs,
County Administration Center
1600 Pacific Highway
Mail Station 201
San Diego, California 92101

Ms. Cordelia Ridenour
Assistant Director, City of
San Diego Environmental
Quality Department
202 C. Street EQD 7-A
San Diego, California 92101

Mr. Norman Schell
San Diego Air Pollution Control Dist.
1600 Pacific Highway
San Diego, California 92101

Mr. Edward Schmidt
Executive Officer
Local Agency Formation Commission
Room 456
1600 Pacific Highway
San Diego, California 92101

Mr. Richard Sommerville
San Diego Air Pollution Control Dist.
1600 Pacific Highway
San Diego, California 92101

Mr. Roger Snobel
San Diego Transit Company
100 Sixteenth Street
San Diego, California 92101

Mr. Larry Taylor
Office of Environmental Management
1600 Pacific Highway
San Diego, California 92101

Mr. Virgil Henson
Director of Building and Planning
207 Highland Avenue
El Cajon, California 92020

Mr. Alan Williams
San Diego Branch - WESTNAVFACENGCOM
1220 Pacific Highway
Attention: 92 EP
San Diego, California 92132

Mr. Frazier Armbruster
San Diego Chamber of Commerce
704 3rd Street
San Diego, California

Mr. Herm Rosenthal
San Diego County
1600 Pacific Highway
San Diego, California 92101

Michael Madigan
Mayor's Office
San Diego, California

Table D.2 - Delphi Panel Members

<u>NAME</u>	<u>ADDRESS</u>
James T. Cheshire	CALTRANS - San Diego
Virgil R. Henson	Planning Department, City of El Cajon
Daniel Lieberman	Air Resources Board, Sacramento
Evan V. Jones	Ace Auto Parks Inc., San Diego
Roger Snoble	San Diego Transit Company, San Diego
W. Alan Williams	Naval Facility Engineering Commission, San Diego
Frazier Armbruster	San Diego Chamber of Commerce
Michel A. Bedaux	Planning Department, City of Oceanside
Max Schmidt	Planning Department, City of San Diego
Steve Sachs	Comprehensive Planning Organization, San Diego
Tomas E. Firlle	San Diego Unified Port District, San Diego
Herm Rosenthal	San Diego County, 1600 Pacific Hwy., San Diego 92101
Mike Madigan	Mayor's Office, San Diego
P. L. Hinshaw	Mayor's Office, San Diego
Norman Schell	Air Pollution Control District, County of San Diego
Rich Sommerville	
Cordelia Ridenour	Environmental Quality Department, City of San Diego
Susan D. Schlosser	Local Agency Formation Commission
Daniel Gorfain	San Diego Coast Regional Commission
Richard Brown	San Diego County Board of Supervisors

Table D.3 - Results of San Diego Delphi Panel

SAN DIEGO DELPHI PANEL
ON
LAND USE CONTROL ALTERNATIVES
FOR
AIR QUALITY MAINTENANCE PLANNING

10 JUNE 1974

Conducted By
Transportation and Environmental Operations of TRW, Inc.
De Leuw, Cather and Company
for
Environmental Protection Agency
Standards Implementation Branch - Durham, North Carolina
Office of Air Programs - Region IX - San Francisco, California

Table D.3 - Results of San Diego Delph Panel

ROUND ONE

PRELIMINARY SCREENING OF EXISTENT AND POTENTIAL CONTROL MEASURES

Instructions: Choose the six (6) "BEST" measures in terms of overall implementability, effectiveness, minimum adverse socio-economic impacts and public acceptance. Indicate in the margin with an "X"

STATE

- 12 A. Environmental Impact Statement (California Environmental Quality Act)
- 1 B. Recreational Land Regulation*
- 9 C. Taxation Policy to Preserve Non-Developed Areas*

REGIONAL

- 10 D. SB 1543 (or Similar Regional Development Plans)*
- 4 E. A-95 Review Process
- 8 F. Direct Source Review
- 6 G. Emission Density Zoning*
- 4 H. Open Space Planning
- 7 I. Regional Water Quality Control Board (Permit Review)
- 4 J. "3-C" Review Process
- 4 K. San Diego Coast Regional Commission (General Plan)

LOCAL

- 8 L. Capital Facility Ordinances
- 8 M. General Plan
- 4 N. Zoning Ordinances (Existing)
- 4 O. Planned Unit Development Ordinance
- 6 P. Capital Improvements Programming
- 7 Q. Indirect Source Review*
- 5 R. Protection of Critical Environmental Areas
- 7 S. Development Timing Controls*

* Potential Control Measures - Not Currently in Use.

Table D.3 (continued) - Results of San Diego Delphi Panel

ROUND TWO

FINAL SCREENING OF EXISTENT AND POTENTIAL CONTROL MEASURES

Instructions: Choose the six (6) "BEST" measures in terms of overall implementability, effectiveness, minimum adverse socio-economic impacts and public acceptance. Indicate in the margin with an "X" Eliminate those control measures from consideration as instructed.

STATE		
11	A. Environmental Impact Statement (California Environmental Quality Act)	
—	B. Recreational Land Regulation*	
10	C. Taxation Policy to Preserve Non-Developed Areas*	
REGIONAL		
9	D. SB 1543 (or Similar Regional Development Plans)*	
1	E. A-95 Review Process	
10	F. Direct Source Review	
6	G. Emission Density Zoning*	
1	H. Open Space Planning	
7	I. Regional Water Quality Control Board (Permit Review)	
—	J. "3-C" Review Process	
—	K. San Diego Coast Regional Commission (General Plan)	
LOCAL		
12	L. Capital Facility Ordinances	
10	M. General Plan	
1	N. Zoning Ordinances (Existing)	
—	O. Planned Unit Development Ordinance	
10	P. Capital Improvements Programming	
10	Q. Indirect Source Review*	
1	R. Protection of Critical Environmental Areas	
9	S. Development Timing Controls*	

* Potential Control Measures - Not Currently in Use.

Table D.3 (continued) - Results of San Diego Delphi Panel

ROUND THREE

RANKING OF "MOST ATTRACTIVE" CONTROL MEASURES

- Instructions: (1) Rank the alternatives from "BEST" (1) to "WORST" (6) for each of the following criteria.
(2) Please base judgments on the attractiveness of the measures for the San Diego Region.

GROUP RESULTS FOR ROUND TWO		RANKING OF "MOST ATTRACTIVE" CONTROL MEASURES					OVERALL "ATTRACTIVENESS" RANKING ^e
CONTROL MEASURE	POTENTIAL EFFECTIVENESS ^a	TECHNICAL FEASIBILITY ^b	POLITICAL- INSTITUTIONAL FEASIBILITY ^c	ECONOMIC FEASIBILITY ^d	PUBLIC ACCEPTANCE		
1. A	3.9 ± 1.6	2.9 ± 1.8	2.6 ± 1.7	2.5 ± 1.7	2.5 ± 1.2	3.1 ± 1.9	
2. L	3.5 ± 1.6	3.6 ± 1.5	2.4 ± 1.3	2.8 ± 1.4	3.3 ± 1.6	3.1 ± 1.5	
3. F	3.0 ± 1.5	2.5 ± 1.2	2.3 ± 1.3	3.5 ± 1.4	3.1 ± 1.6	3.0 ± 1.3	
4. M	4.3 ± 1.8	3.5 ± 1.9	2.4 ± 1.3	3.1 ± 1.7	2.9 ± 1.9	3.2 ± 1.9	
5. D	3.4 ± 1.8	4.3 ± 1.7	3.1 ± 1.7	4.7 ± 1.8	4.7 ± 1.5	4.3 ± 1.9	
6. O	3.0 ± 1.8	4.4 ± 1.4	2.8 ± 1.8	4.6 ± 1.6	4.6 ± 1.3	4.4 ± 1.2	

^a Judged from the viewpoint of improving air quality

^b Availability of knowledge, simulation models, etc. to implement measure

^c In terms of existing or potential governmental structures for developing, implementing, and enforcing the measure

^d Availability of funds to evaluate, implement, and enforce the measure (e.g. research, data collection, enforcement personnel, planners)

^e Record these results in the first column of ROUND FOUR (next page) under "My Ranking." Do so in your order of preference from "BEST" (1) to "WORST" (6)

Table D.3 (continued) - Results of San Diego Delphi Panel

ROUND FOUR

RANKING OF OVERALL "ATTRACTIVENESS" AND "IMPLEMENTABILITY"

ROUND THREE RESULTS FOR OVERALL "ATTRACTIVENESS"			RANKING OF IMPLEMENTATION OBSTACLES*							
MY RANKING	CONTROL MEASURE	OVERALL "ATTRACTIVENESS" RECONSIDERED	GROUP RANKING	CONTROL MEASURE	LEVEL OF FUNDING	GOV'T. STRUCTURE	LACK OF ENABLING LEGISLATION	INADEQUATE STATE-OF-THE-ART TECHNOLOGY	PUBLIC ACCEPTANCE	LACK OF PRECEDENTS
(BEST) 1.	F	(2.6 ± 1.4)	1.	F	3.1±1.5	2.3±1.5	4.8±2.0	3.3±1.7	3.4±1.2	3.9±1.7
2.	A	(3.2 ± 1.7)	2.	A	3.1±1.3	2.4±1.3	5.2±1.8	2.9±1.8	3.8±1.6	3.3±1.4
3.	L	(2.7 ± 1.3)	3.	L	3.1±1.3	2.6±1.5	4.3±2.1	3.9±1.3	3.3±1.8	3.8±1.8
4.	M	(3.5 ± 1.2)	4.	M	2.7±1.8	2.8±1.6	4.6±2.0	3.4±1.6	3.6±1.2	4.1±1.4
5.	D	(4.3 ± 1.8)	5.	D	4.3±1.5	2.5±1.2	3.0±1.8	3.8±1.5	3.1±2.2	4.3±1.6
(WORST) 6.	N	(4.8 ± 1.3)	6.	N	3.8±1.2	3.2±1.3	1.7±1.9	3.1±1.8	2.5±1.6	3.9±1.7

SAMPLE

2	5	6	3	1	4
---	---	---	---	---	---

* Instructions: (1) For each control measure (Group Ranking Order), rank the implementation obstacles from Most Important (1) to Least Important (6).

(2) Record these results in the blank spaces of ROUND FIVE as indicated.

Table D.3 (continued) - Results of San Diego Delphi Panel

ROUND FIVL

ROUND THREE GROUP RESULTS CONTROL MEASURE	RANKING OF IMPLEMENTATION OBSTACLES (Analysis By Individual Control Measure)					LACK OF PRECEDENTS (4.6±1.2)
	LACK OF FUNDING (2.5±1.2)	GOV'T STRUCTURE (2.1±1.4)	LACK OF ENABLING LEGISLATION (5.3±1.5)	INADEQUATE STATE-OF-ART TECHNOLOGY (2.8±1.0)	PUBLIC ACCEPTANCE (3.8±0.9)	
1. F	(2.5±1.2)	(2.1±1.4)	(5.3±1.5)	(2.8±1.0)	(3.8±0.9)	(4.6±1.2)
2. A	(2.7±1.2)	(2.0±0.9)	(5.3±1.6)	(2.6±1.4)	(4.4±1.1)	(3.9±1.3)
3. L	(2.7±1.2)	(1.9±1.4)	(4.9±1.9)	(3.9±0.8)	(3.1±1.3)	(4.2±1.2)
4. M	(1.9±1.5)	(2.0±0.5)	(5.5±1.1)	(3.4±1.2)	(3.6±0.8)	(4.8±0.6)
5. D	(4.5±1.3)	(1.9±0.8)	(3.0±1.8)	(3.8±1.3)	(3.1±1.4)	(4.7±1.2)
6. Q	(3.6±1.2)	(3.2±0.9)	(5.2±1.6)	(2.6±1.5)	(1.9±1.3)	(4.7±1.0)

SAMPLE

2 (3) 5 (4) 6 (6) 3 (2) 1 (1) 4 (5)

Instructions: Upon consideration of the group's responses, we would like you to reconsider your answer; more importantly, if you continue to be an "extreme" value, we would like you to give us the reasons/rationale behind your thinking.

Reasons for "Extreme" Values

Control Measure #

Control Measure #

(Use reverse side if necessary)

Table D.3 (continued) - Results of San Diego Delphi Panel

ROUND SIX

RANKING OF CONTROL MEASURE EFFECTIVENESS *
(Comparison of Different Control Measures)

ROUND THREE GROUP RESULTS		TO PROMOTE BALANCED DEVELOPMENT OF RESIDENTIAL/ COMMERCIAL AREAS				TO CONTROL EXTENT AND DIRECTION OF FUTURE GROWTH		SAMPLE
CONTROL MEASURE		TO REDUCE NEED FOR AUTO TRAVEL	TO LIMIT RATE OF URBANIZATION IN RURAL AREAS					
1.	F	<u>5.2 ± 1.3</u>	<u>5.4 ± 1.2</u>	<u>5.3 ± 0.9</u>	<u>5.4 ± 0.8</u>			<u>2</u>
2.	A	<u>3.6 ± 1.2</u>	<u>4.0 ± 1.6</u>	<u>3.7 ± 1.4</u>	<u>4.1 ± 1.3</u>			<u>4</u>
3.	L	<u>3.2 ± 1.3</u>	<u>2.7 ± 1.2</u>	<u>3.1 ± 1.2</u>	<u>2.6 ± 1.1</u>			<u>5</u>
4.	M	<u>2.3 ± 1.6</u>	<u>2.4 ± 1.7</u>	<u>1.5 ± 0.9</u>	<u>2.1 ± 1.5</u>			<u>6</u>
5.	D	<u>3.0 ± 1.6</u>	<u>2.8 ± 1.4</u>	<u>2.9 ± 1.5</u>	<u>2.3 ± 1.2</u>			<u>3</u>
6.	Q	<u>3.6 ± 2.0</u>	<u>3.8 ± 1.6</u>	<u>4.4 ± 1.5</u>	<u>4.5 ± 1.2</u>			<u>1</u>

Instructions: 1) For each effectiveness criterion listed (e.g. reduce need for auto travel), rate the control measures from MOST EFFECTIVE (1) to LEAST EFFECTIVE (6).

2) Record these results in the blank spaces of ROUND SEVEN as indicated.

*Where effectiveness criterion are not applicable, leave blank; record these results in the blank spaces of round seven.

Table D.3 (continued) - Results of San Diego Delphi Panel

ROUND SEVEN

CONTROL MEASURE EFFECTIVENESS RATING*

	ROUND THREE GROUP RESULTS	EFFECTIVENESS OF CONTROL MEASURE				S A M P L E
		TO REDUCE NEED FOR AUTO TRAVEL	TO LIMIT RATE OF URBANIZATION IN RURAL AREAS	TO PROMOTE BALANCED DEVELOPMENT OF RESIDENTIAL/ COMMERCIAL AREAS	TO CONTROL EXTENT AND DIRECTION OF GROWTH	
1.	F	(5.5 ± 0.5)	(5.7 ± 0.6)	(5.5 ± 0.9)	(5.5 ± 0.6)	()
2.	A	(3.8 ± 1.0)	(4.2 ± 1.4)	(3.8 ± 1.2)	(4.2 ± 1.1)	()
3.	L	(2.9 ± 1.1)	(2.6 ± 1.4)	(3.1 ± 1.2)	(2.5 ± 1.1)	()
4.	M	(2.4 ± 1.4)	(2.2 ± 1.0)	(1.5 ± 1.0)	(2.3 ± 1.5)	()
5.	D	(2.8 ± 1.5)	(2.5 ± 1.3)	(2.9 ± 1.3)	(2.3 ± 1.1)	()
6.	N	(3.7 ± 1.8)	(3.6 ± 1.3)	(4.3 ± 1.4)	(4.4 ± 1.2)	()

Instructions: Upon consideration of the group's responses, we would like you to reconsider your answer; more importantly, if you continue to be an "extreme" value, we would like you to give us the reasons/rationale behind your thinking.

Reasons for "Extreme" Values

* Where effectiveness criterion not applicable, leave blank.

APPENDIX E

RECENT CALIFORNIA ENVIRONMENTAL AND LAND USE LEGISLATION

This appendix reviews pertinent State legislation (existing and pending) that have potential impact on air quality by virtue of the fact that they contain land use control measures. Land use control has traditionally been a function of cities and counties through state enabling legislation under the state police powers to protect the public health, safety and general welfare of its citizens. The new trend, however, is to move away from local control and place more of the land use policy development at the regional and even state levels. Naturally, this trend has met with resistance from local governments who desire to retain their jurisdictional controls and from a Congress that hesitates to enter an area of control that is traditionally local. A number of land use bills are currently pending in the California Legislature that propose innovative and new approaches for air quality maintenance and land use control but do not have very promising prospects of being passed during the current session. This may be due to the recent Congressional defeat on a procedural motion of a major piece of national land use legislation sponsored by Udall that would have given financial assistance for state planning efforts. The fact that 1974 is an election year and other national political developments have also served to make the passage of controversial bills very difficult this year. In the following review, only significant pieces of legislation that might impact on regional air quality are included.

ENACTED LEGISLATION

The following bills have already been enacted and enjoy varying degrees of success. Their common problem has been the lack of initiative of state and local agencies to apply the spirit of the legislations.

LAND CONSERVATION ACT - WILLIAMSON (1965)

This bill was designed to alleviate pressures for conversion of agricultural lands and to preserve open space by providing preferential tax assessment based upon the productive value of the land. It has not succeeded and faces a number of problems in achieving its objectives. Under this act, private landowners can contract agricultural and other lands to be restricted to open space and so enjoy reduced taxes. The state pays a subvention to local government for a portion of the foregone property taxes. The program established by this act does not serve a local or regional land use purpose because it leaves the initiative with the landowner to provide his land for open space.

SUBDIVISION MAP ACT AMENDMENT - MCCARTHY (1970)

This amendment to the Subdivision Map Act attempted to relate the planning, zoning and subdivision processes by requiring that

- i) after 1973, cities and counties could not approve a tentative or final subdivision map inconsistent with their general plans;
- ii) after 1973, local zoning ordinances and variances must conform to the general plan;
- iii) beginning in 1973, it became illegal for local and county municipalities to amend their general plans more than three times a year.

MCATEER-PETRIS ACT AMENDMENT (1969)

This act established the Bay Conservation and Development Commission (BCDC) as a permanent state agency to regulate and plan for the lands bordering the San Francisco Bay.

CALIFORNIA COASTAL ZONE ACT (1972)

This act established the California Coastal Zone Commissions and empowered them with a development permit system for virtually all construction or changes within a 1000 yard band along the shoreline. A California Coastal Zone Plan is also being developed under the Act and will be presented to the California Legislature in 1976.

AB 1575 - WARREN (1973)

Effective in 1975, this bill creates a five-man Energy, Resources Conservation and Development Commission which will monitor and review proposed sitings of power plants of over fifty megawatts. The Commission is empowered to enforce the rules and regulations of local agencies concerning sitings and imposes regulations where none exist. It has pre-emptive authority through the review process which is performed at an early stage in the decision process. The Commission will also arbitrate between the utility company and local agencies where non-compliance occurs. It has no pre-emptive powers in matters that concern air and water quality.

CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA) (1970)

Enacted in 1970 and enhanced through subsequent Supreme Court rulings (see below), this act established procedural requirements for environmental impact reporting.

AB 889 (1972)

This bill was passed subsequent to a Supreme Court ruling and extends CEQA's application by requiring that local governments prepare environmental impact reports on projects over which they have permit review power.¹

¹ Friends of Mammoth vs. Mono County (1972)

² Ibid.

SB 981 (1972)

This bill directed the Air Resource Board (ARB), in consultation with the Office of Planning and Research and the Office of Intergovernmental Management, to prepare a report on the proposed guidelines for the preparation of an air pollution control in city and county general plans.

In response to this bill, ARB initiated a study² of proposed guidelines for preparation of an air pollution element in city and county plans which is the basis for SB1543, now pending in the California legislature (see below).

PENDING LEGISLATION (CURRENT SESSION)

The following bills, now pending, represent attempts to reconcile air quality with general plans at the regional and local levels, create a regulatory commission for land use, establish a program for defining environmentally critical areas, consolidate multi-jurisdictional, multi-functional agencies and improve existing legislation. The status of each bill as of June 18 is indicated in parentheses.

SB 1543 - NEJEDLY (Senate Committee on Local Government)

This bill requires the ARB to:

- ° establish allowable emission limits for each pollutant
- ° provide emission factors which relate quantity and type of pollutants to land use and transportation plans
- ° monitor the general plans and environmental impact reports of non-major air basins of the State

In San Diego, the Comprehensive Planning Organization (CPO) would be required to:

- ° determine that the regional transportation plan is consistent with the allocation emissions and to ensure that the finally adopted plan is in conformance with allocations emissions
- ° adopt emissions limits stating the quality of pollutants in each pollutant category in subdivisions of the air basin which were established for emissions allocation purposes
- ° review environmental impact reports for projects with potential air quality impacts
- ° review city and county general regional land use and transportation plans for conformance with the emissions limits allocated to the basin subdivisions

Cities and Counties shall:

- ° determine that air pollution emissions directly or indirectly generated by the land use and transportation aspects of their plans do not violate allowable emissions levels
- ° provide for a review procedure of air pollution emissions of proposed projects

Air pollution control districts shall:

- ° review their orders, rules and regulations to conform with the allocations of emissions limits
- ° exercise permit reviews to monitor projects which have impact on air quality

AB 2978 - PRIOLO (Assembly Ways and Means Committee)

This bill would create a State Land Use Commission and Department of Land Use Management, and requires local public agencies to nominate areas of critical state concern. The State Land Use Commission is designed to

- i) facilitate, coordinate and monitor state and local land use programs, expenditure of state funds and federal grants-in-aid projects
- ii) prepare a policies report which shall be a comprehensive state land use policy report to be subject to review every two years

The Department of Land Use Management shall

- i) analyze and report state policies for land use goals, EIR's state actions detrimental to the land use goals
- ii) study economic effects of land use policies
- iii) monitor expenditures and state and local programs for regulation of critical areas

By January 1976, the Commission is required to submit a California Report on Areas of Critical Concern, delineating those areas which contain important agricultural, historical, cultural, or aesthetic values. Subsequently, the Commission is required to submit a set of development guidelines for the critical areas and insure that local plans and ordinances conform with the guidelines.

AB 2040 - KNOX (Senate Local Government Committee)

This bill would create a Regional Planning Agency for the S.F. Bay Area that would exercise veto power over individual local governments' actions that do not conform with the Agency's Plan. It would act as the umbrella agency to oversee the Metropolitan Transportation Commission and Bay Area Sewer Services Agency.

AB 1254 - BERMAN (Senate Finance Committee)

This bill would create governing body for an area of critical concern, the Santa Monica Mountains. A set of development guidelines for the area would regulate land use.

SB 1556 - BIDDLE (In Senate for Vote)

This bill would establish a South Coast Air Pollution Control District, similar to the Bay Area Pollution Control District, that has jurisdiction over the entire South Coast air basin. In addition, it would require that board members of the Air Resources Board be appointed to fixed four year terms on a full time basis and can serve only if they are confirmed by the Legislature. Several similar bills have been introduced in previous sessions and have been unsuccessful in gaining passage.

AB 3421 - Z'BERG (Assembly Ways and Means Committee)

This bill is based on a study of the organization of state-level environmental resources control board with land use and other powers, which was directed by Assembly Concurrent Resolution, November 16, 1973 Session.

This bill would create an independent State Environmental Resources Board and nine Regional Environmental Resources Boards with responsibility and authority for development and implementation of a comprehensive state land use plan and for comprehensive control of air, water, solid waste, pesticide, nuclear radiation and noise pollution. The Board would also be charged with the development and implementation of a statewide comprehensive transportation plan.

The Act also provides for public involvement by creating a permanent Citizens Environmental Protection Council to advise the State Board on its policies and programs.

AB 2850 - DUNLAP (Passed Assembly, in Senate)

This is an amendment to the Williamson Act which requires that lands eligible for special tax considerations under the Williamson Act already be designated in the local general plan. It serves to ensure some degree of consistency between the Williamson Act and local plans.

AB 2852 - DUNLAP (Assembly Committee for Revenue and Taxation)

This bill provides for phased development in the local plan by requiring that such lands scheduled for development in the subsequent ten years be designated in the plan. Such lands would then be eligible for tax deferment privileges under the Williamson Act. The objective of the Bill is to discourage leapfrog development.

AB 2853 - DUNLAP (Passed Assembly, in Senate)

This bill revises and simplifies the formula for subvention payments under the Williamson Act. It gives priority to fringes of urban areas.

AB 2854 - DUNLAP (Assembly Committee for Revenue and Taxation)

This act serves to simplify the procedures for applying for a Williamson contract and reduces the open space easement (period of time before development occurs) from twenty to ten years for eligibility for a contract.

AB 2856 - DUNLAP (Assembly Committee for Revenue and Taxation)

This bill establishes state environmental contract program whereby, if a Williamson Act contract is denied, and the land is demonstrated to be in an area of critical state concern, the State Resources Agency may grant a contract for fifteen years.

AB 2859 - DUNLAP (Passed Assembly, in Senate Committee on Local Government)

This bill requires that when the Local Agency Formation Commissions (LAFCO) draw up their spheres of influence, they must consider the existence of agricultural and open space lands. In approving annexations, LAFCO's should place priority on preserving agricultural land usage.

APPENDIX F

EMISSION PROJECTION MODELING

The projection of pollutant emissions in San Diego is the culmination of a series of projections made by the Comprehensive Planning Organization in conjunction with the California Department of Transportation. This appendix is devoted to a description of the models and procedures employed in this process.

F.1 THE CPO MODELING SYSTEM

The CPO is using a series of computer forecasting models in order to project and distribute the population, employment, transportation and land use characteristics for each of the Regional Development Alternatives to the year 1995. Each model requires a series of policy assumptions as "input." The overall model sequence is shown on Table F-1.

Interactive Population/Employment Forecasting Model (IPEF)

The Interactive Population/Employment Forecasting Model (IPEF), is a regional growth model designed to simulate the regional population and employment growth process under different assumptions and policies. It considers such factors as mortality rates, birth rates, the effects of the military population, the influence of industrial growth, the impact of retired people migrating to the region and the unemployment rate. The outputs or products of the IPEF model are regionwide forecasts of population and employment at five-year intervals for up to 30-40 years into the future. These products are used as inputs to the Urban Development Model.

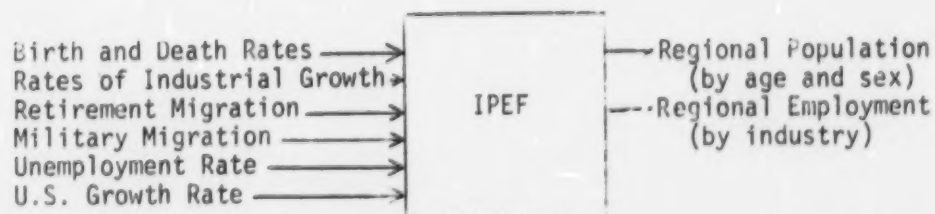
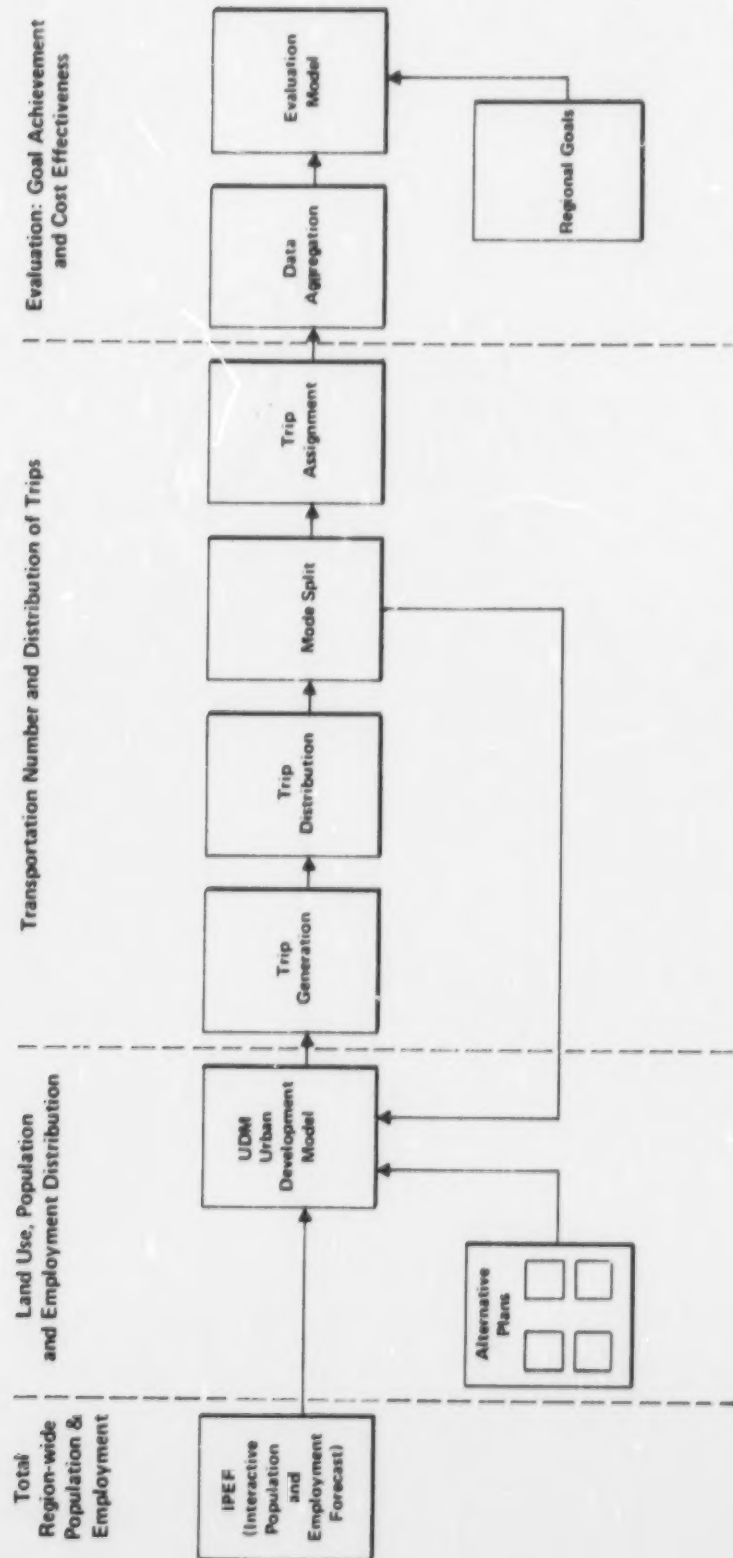


TABLE F-1
CPO MODEL SEQUENCE



The IPEF model is a synthesis of two widely used techniques: the cohort-survival method of population forecasting and an econometric approach to employment forecasting. Traditionally, these methods have been employed independent of each other, with the cohort-survival method considering such things as birth rates, death rates, and historical migration patterns, and the econometric model deriving employment forecasts from past trends, national and state growth patterns, and interindustry relationships. Within the IPEF model framework these two techniques are combined so that the linkages between the demographic and economic sectors are explicit.

The population-employment linkages are in two directions and account for (1) the impact of employment opportunities on population migration, and (2) the alternate effect of changes in the level of population on population-serving employment.

Figure F-1 below, illustrates the relationship between the demographic and economic sectors explicit in the model framework. The economic sector is divided into two components: basic and population-serving. The "basic" component is assumed to be a function of the region's comparative advantage (as reflected in historical trends) and the growth of external (i.e., national) markets, and is, therefore, independent of both the population-serving component of the economic sector and the demographic sector. The "population-serving" component is assumed to respond to changes in both the basic economic sector (as changes in basic employment alter the demand for business-serving activities) and the demographic sector (as changes in population alter the demand for household-serving activities).

The demographic sector can also be divided into two components: an "autonomous" component consisting of births, deaths, retirement migration, and military migration, and a "dependent" component consisting of employment related migration. Births and deaths are calculated by applying age-specific fertility and survival rates to the base period population. Retirement and military migration are determined outside the model framework and are supplied as inputs to the model. The employment related

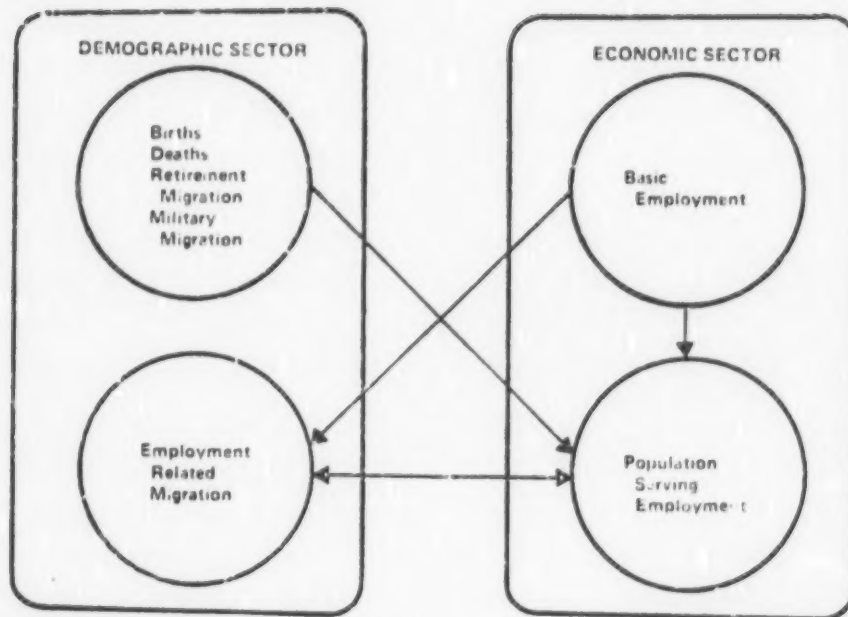


Figure F-1. IPEF Model: Interrelationships Between the Demographic and Economic Sectors

migration component is a function of changes in total employment which, in turn, is the sum of changes in basic and population-serving employment. This linkage is shown in Figure F-1 by the diagonal and horizontal arrows running from the economic sector to the employment related migration component of the demographic sector.

The "two headed" horizontal arrow between employment related migration and population serving employment reflects the reciprocal impulses existing between the demographic and economic sectors. Autonomous changes in the demographic sector through births, deaths, retirement migration or military migration, or autonomous changes in the basic employment sector will have a multiplier effect on population serving employment, brought about through changes in employment related migration. The multiplier effect results from the secondary impulses that migration has on population-serving employment as the migrants produce or withdraw demands for population serving activities.

The Urban Development Model (UDM)

The land-use model employed by CPD is a version of the Projective Land-Use Model (PLUM) originally developed for the San Francisco Bay Area Transportation Study Commission.

PLUM is designed to yield projections of the future small-area (i.e., zone level) distribution of population, employment and land-use within an urban area based upon information on the distribution of these characteristics in some base-year, coupled with a series of simple and intuitively appealing allocation algorithms.

These algorithms are based upon two fundamental concepts. The first of these relates to a distinction between "basic" and "population-serving" employment, and the second employs the notion of a spatial "allocation function."

"Population-serving" employment is that for which a local market or service area may be identified based upon the location of the households which it is intended to serve. Typical examples might include retail stores, schools, and the bulk of local government activities. "Basic" employment includes all other employment activities - that is, all that employment whose location is relatively less dependent upon the precise location of households within the urban region but rather on other factors such as proximity to transportation facilities, space availability, agglomeration economics, etc. Typical example of this latter category might be major industrial activities, regional service activities, etc.

"Basic" employment is located exogenously prior to the operation of PLUM. A series of three spatial allocation functions are then used to distribute the remaining "population-serving" employment and households around these "basic" employment centers. This process proceeds in three steps, as illustrated in Figure F-2.

- (1) An initial set of households associated with persons employed in "basic" employment activities are distributed with respect to the exogenously specified locations of "basic" employment;

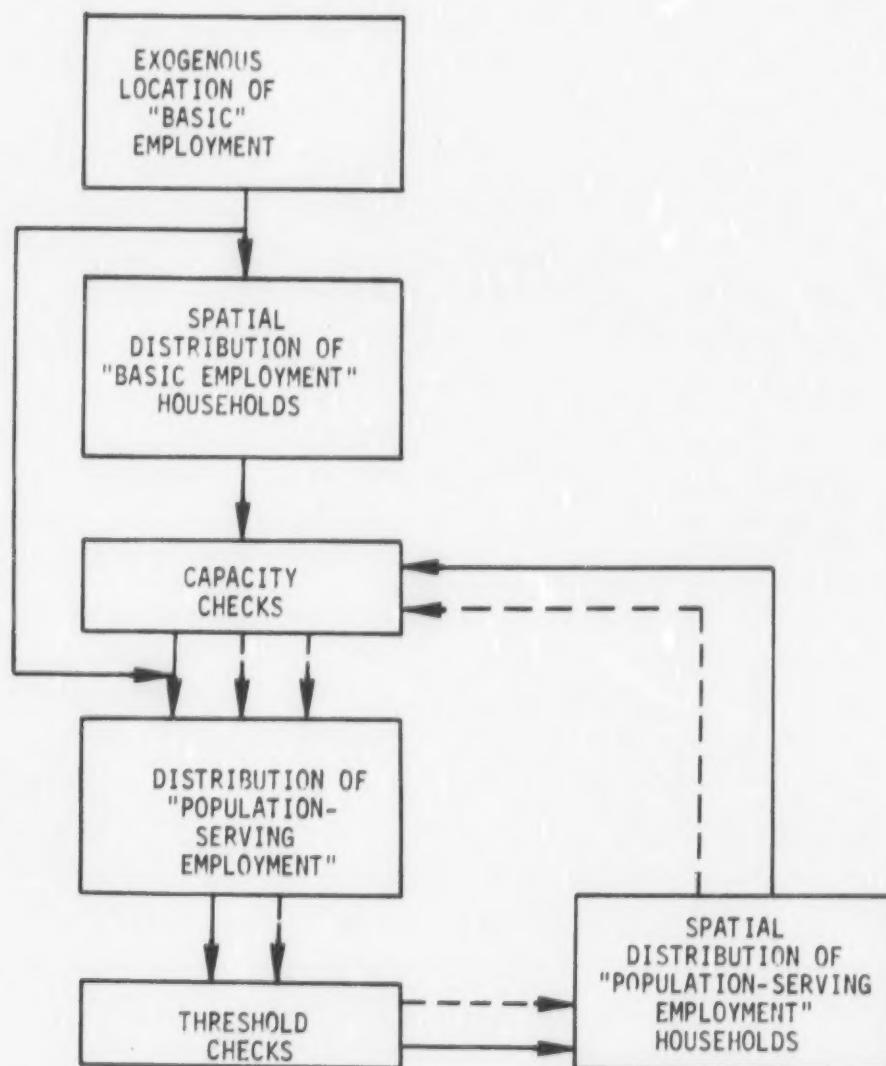


Figure F-2. Illustrative Structure of "PLUM"

- (2) "Population-serving" employment is then distributed with respect both to this initial distribution of households and to the previously specified locations of "basic" employment; and
- (3) Finally, a second set of households associated with persons employed in "population-serving" employment activities are distributed around those latter employment locations.

The allocations in each case are based upon simplistic descriptions of the spatial relationships between the activities involved, based primarily on existing, base-year trip-making behavior and transportation networks. Three separate sets of allocation functions are developed for "work-to-home" (steps #1 and #3 above), for "home-to-shop" (step #2) and for "work-to-shop" (step #2). Each function takes the general form illustrated in Figure F-3. In the case of the "work-to-home" function, for example, the ordinate represents the probability of a worker locating his residence at a given time (or distance) from his work place. These functions are calibrated in part from inter-zonal travel-time matrices derived from conventional transportation network analysis and in part from considerations of each zone's potential "attractiveness" as a location for the activity being distributed. In the case of population, for example, this "attractiveness" is represented in terms of the residential capacity of the available vacant land.

For any given year, the model iterates to a single, equilibrium solution, based upon the achievement of balance between the initial exogenously specified location of basic employment and the resultant distribution of population-serving employment and the set of households associated with both employment categories. These allocations are subject to a set of constraints, including an upperbound capacity constraint for households within each district, a minimum threshold constraint for the size of population-serving employment and a set of land-consumption constraints reflecting the manner in which vacant land is consumed by development. The result is a final, internally-consistent set of small-area projections of employment, population and land use by small-area for a given target year. For purposes of forecasting over a series of

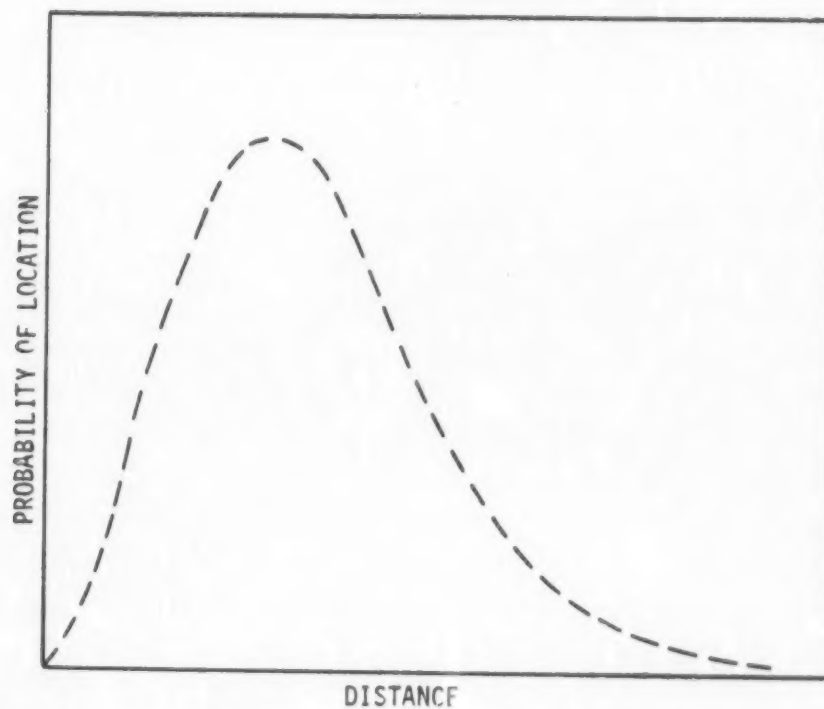


Figure F-3. General Form of Spatial Allocation Function in "PLUM"

time intervals the model is applied recursively, with the outputs for each forecast-year serving as the base for the next set of forecasts.

Specifically, the output of the San Diego version of PLUM (UDM) includes 22 different data items concerning population, housing, employment and land use for each of 663 geographic traffic assignment zones. It is this data which will be used to evaluate the ability of the various Regional Development Alternatives to achieve Regional Goals and Objectives. These specific items are listed in the following table:

Urban Development Model Output Categories

1. Occupied housing units
2. Single family housing units
3. Multiple family housing units
4. Total population
5. Household population
6. Group quarters population
7. Employees at place of residence
8. Total employment
9. Basic employment
10. Retail employment
11. Business service employment
12. Retail service employment
13. Education-related employment
14. Other employment
15. Households by income category
16. Average housing value
17. Total acreage
18. Net residential acreage
19. Acreage used for basic employment
20. Acreage used for local serving employment
21. Acreage used for streets and highways
22. Vacant land

Transportation Models

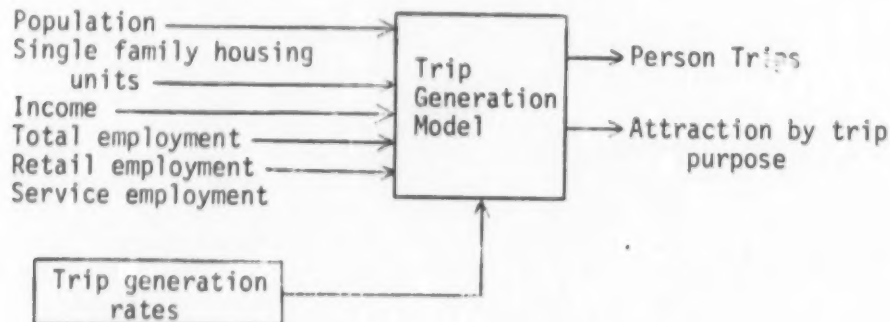
CPO is using a series of four transportation models to test, or evaluate, alternative regional transportation systems for the region. These four models are:

1. Trip Generation Model
2. Trip Distribution Model
3. Mode Split Model
4. Trip Assignment Model

Trip Generation Model. Trip generation is the process of relating the number of trips to characteristics of land use. In other words, it forms a tie between land use activity and travel.

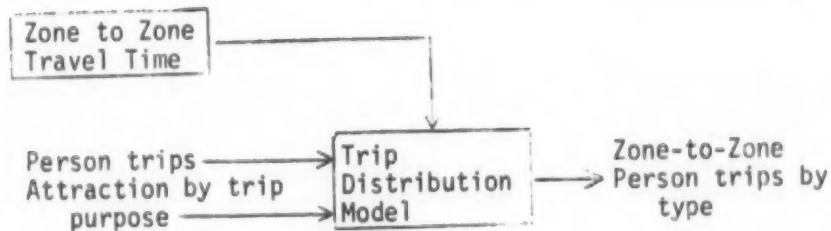
It determines the number of trips which will start or end in a particular traffic assignment zone based on the demographic and land use characteristics of that zone. It does not connect the trip ends to form trips as we normally think of them - this is done by the trip distribution model.

The desired end product of a trip generation analysis is an accurate estimate of the number of trip beginnings and endings in each of the traffic assignment zones within the San Diego region.

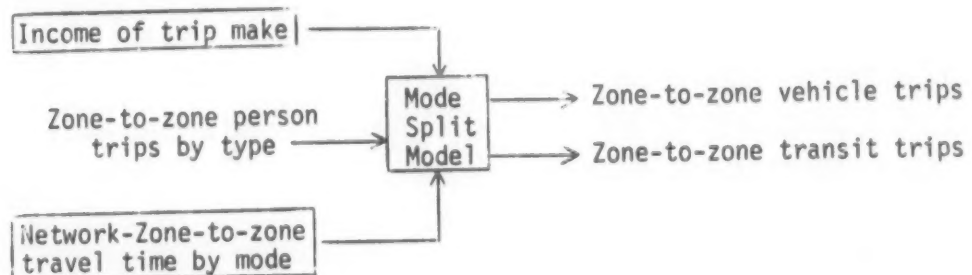


Trip Distribution Model. Trip distribution is the process by which trips originating in one traffic assignment zone are distributed to other zones in the study area. Whereas the generation model identifies only the number of trips beginning and ending at any location, the distribution model identifies where the trips are coming from or going to. Several types of transportation distribution models have been built. The most widely used is the gravity model, which is used in the San Diego Transportation Model.

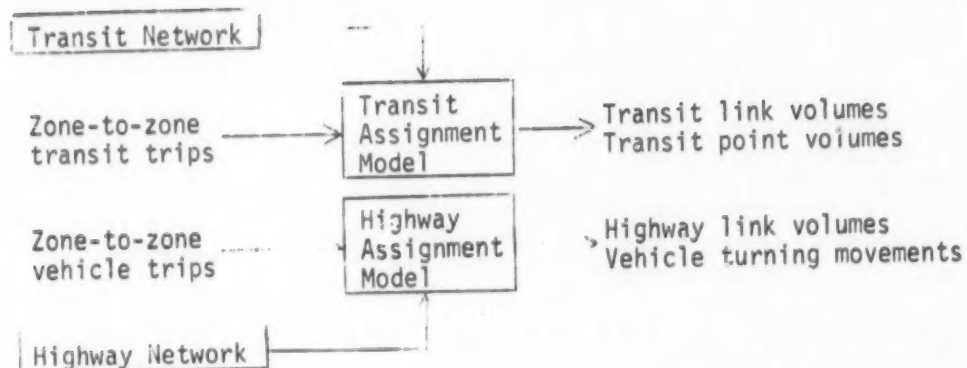
The gravity model loosely parallels Newton's gravitational law. It is based upon the assumption that all trips starting from a zone are attracted by the various generators and this attraction is in direct proportion to the size of the attraction and in inverse proportion to the spatial separations between them. The measure of the spatial separation is the zone to zone travel time as expressed in the network.



Mode Split Model. The mode split model forecasts the distribution of total trips among the available modes of transportation. A unique mode split is forecast for each traffic assignment zone. The model incorporates the characteristics of both the transportation system and the user. Transportation characteristics include fares, travel time, wait time and convenience. User characteristics include income and spatial distribution (location). The purpose of the trip is also considered in determining the proportion of total trips between any two places that would patronize a particular mode.



Trip Assignment Model. Trip assignment is the process of routing the trips to specific linkages of a transportation system (freeway, arterial, transit). Trip assignments to the transportation network are made based on the assumption that people will choose the fastest available route to their destination. Separate assignments are made for each mode based on the mode split output percentages.



Plan Evaluation Model

The evaluation of the Regional Development Alternatives policies requires two types of computer operated activity: Data Aggregation and Evaluation.

The first task is to identify the most pertinent data coming from the UDM and the transportation models and to aggregate this data at the geographic levels which will be used in Regional Plan Evaluation -- the cities of the Region, the coastal area, or for socio-economic areas.

In the second operation, the evaluation of Plan impacts, certain data items are used to measure how well each of the Regional Development Alternatives meets the Regional Goals and Objectives. Criteria have been developed based on the Regional Goals. Using data forecast by UDM and the transportation models, the plan evaluation model will measure the degree to which each Regional Development Alternative achieves regional goals and objectives, producing a "goal achievement score" for each alternative.

F.2 EMISSIONS MODELING

The projection of stationary source emissions on the basis of the employment projections generated during the CPO modeling process has been outlined in Section 3 of this report. Motor vehicle emissions may be projected on the basis of the output of the traffic modeling sequence, which results in estimates of projected vehicle miles travelled (VMT).

The calculation of light and heavy duty vehicle exhaust emission factors for carbon monoxide, hydrocarbons and oxides of nitrogen can be expressed mathematically as:

$$e_{np} = \sum_{i=n-12}^{n+1} c_{ip} \cdot d_{ipn} \cdot m_{in} \cdot s_{ip}$$

where

e_{np} = emission factor in grams per vehicle mile for calendar year n and pollutant p ,

c_{ip} = the 1975 federal test procedure (C-2) emission rate pollutant p (grams/mile) for the i th model year, at low mileage,

d_{ipn} = the controlled vehicle pollutant p emission deterioration factor for the i th model year at calendar year n ,

m_{in} = the weighted annual travel of the i th model year during calendar year n . (The determination of this variable involves the use of the vehicle model year distribution),

s_{ip} = the weighted speed adjustment factor for exhaust emission for pollutant p for the i th model year vehicles.

In addition to exhaust emission factors, the calculation of hydrocarbon gasoline motor vehicle emissions involves evaporative and crankcase hydrocarbon emission rates. Evaporation and crankcase emissions are determined using:

$$f_n = \sum_{i=n-12}^{n+1} h_i \cdot m_{in}$$

where,

f_n = the combined evaporative and crankcase hydrocarbon emission factor for calendar year n ,

h_i = the combined evaporative and crankcase emission rate for the i th model year,

m_{in} = the weighted annual travel of the i th model year during calendar year n .

- A light-duty vehicle is defined as any motor vehicle either designated primarily for transportation of property and rated at 6,000 pounds GVW (gross vehicle weight) or less, or designated primarily for transportation of persons and having a capacity of 12 persons or less. A heavy-duty vehicle is any vehicle which exceeds the above specifications.
- The deterioration factor (d) is the ratio of the pollutant p exhaust emission factor at x miles to the pollutant p exhaust emission factor at 4,000 miles. The factors used are obtained from the Environmental Protection Agency.
- The weighted annual mileage factor (m) is determined by the following formula:

$$m_{in} = \frac{V_i \times D_i}{\sum_{i=n-12}^n V_i \times D_i}$$

where,

V_i = fraction of total vehicles in use with age i (in years) (determined from vehicle registration data for the region in question).

D_i = average miles driven by a vehicle of age i .

- The weighted speed adjustment factor(s) enables the calculation of a region-wide emission factor that takes into account variation in average route speed. This variable is calculated using:

$$s_{im} = \sum_{j=1}^n f_j \cdot v_j$$

where,

s_{im} = the weighted speed adjustment factor for exhaust emission of pollutant p for the i th model year, during calendar year m

f_{jm} = the fraction of the total annual vehicle miles traveled at speed j during the calendar year m

v_j = the vehicular average speed correction factor for average speed j .

Having computed the emission factors, the final step is to multiply the emission factor by the vehicle miles traveled (VMT) to derive total motor vehicle emissions. Table F-2 summarizes the results of these calculations for San Diego.

Table F-2. Light and Heavy Duty Vehicle Emissions
(Tons/Day)

		<u>RHC</u>	<u>CO</u>
<u>1972</u>			
Fwy	LDV	53.10	341.05
City	LDV	58.73	434.08
LDV Total		111.83	775.13
Fwy	HDV	8.49	61.38
City	HDV	9.88	78.13
HDV Total		18.37	139.51
<u>1977</u>			
Fwy	LDV	15.13	76.77
City	LDV	15.37	95.46
LDV Total		30.50	172.23
Fwy	HDV	61.20	59.26
City	HDV	6.69	73.68
HDV Total		12.81	132.94
<u>1980</u>			
Fwy	LDV	8.13	37.66
City	LDV	8.22	46.32
LDV Total		16.35	83.98
Fwy	HDV	4.38	62.57
City	HDV	5.12	76.95
HDV Total		9.44	139.52
<u>1985</u>			
Fwy	LDV	4.53	17.20
City	LDV	4.47	20.84
LDV total		9.00	38.04
Fwy	HDV	3.20	72.09
City	HDV	3.78	87.36
HDV Total		6.98	159.45
TOTAL		15.98	197.49

APPENDIX G

TECHNICAL ASSUMPTION MEETING



COUNTY OF SAN DIEGO

INTER-DEPARTMENTAL CORRESPONDENCE

DATE October 24, 1973

TO: Participants of the October 15, 1973 Meeting
on Technical Assumption

FROM: Norman E. Schell

SUBJECT: Minutes of the Meeting

The purpose of this meeting was to establish a single set of technical assumptions that will be used to revise the 1972 emission inventory, prepare projections and evaluate proposed control strategies. To this end we consider it successful.

Enclosed are the minutes of the meeting and a list of persons attending. Please note that motorcycles, heavy duty diesel and off-road vehicle emissions were not discussed during the course of the meeting. As a result, we plan to use the best available data to calculate emissions from these sources.

Norman E. Schell
Deputy Air Pollution Control Officer

NES:RSO:ba

PARTICIPANTS

Universal Oil Products
Jack Gochel (Consultant)
Roy Heimbrock
Dave Robson

ENVIRONMENTAL PROTECTION AGENCY
Ron Mueller

AIR RESOURCES BOARD
Harmon Wong-Woo
Terry Maguire
Howard Linnard

County Office of Environmental Management
Larry Taylor
Merrill Hayden
Michael Sloop

Comprehensive Planning Organization
Steve Sacks

City of San Diego Environmental Quality Department
James Gleason

San Diego Air Pollution Control District
Norman Schell
John Farnsworth
Andy Segal
Mark Evetovich
R. J. Sommerville

Personal Interest
Dr. Steigerwald

BASE YEAR AND MAXIMUM OXIDANT READING

The participants agreed to use 1972 as the base year and 0.32 as the maximum oxidant reading.

PETROLEUM MARKETING

Evaporation Emission Factors: It was observed that emission factors published by EPA in AP-42 was of insufficient detail to reasonably estimate evaporative emissions from jet and diesel fuels during storage and handling. In addition there was no information concerning residual fuel oil.

It was agreed to use a new interim EPA data set, provided by the ARB Representative, to calculate emissions from petroleum storage and handling. No new information on residual fuel oil was obtained.

Reactivity of Petroleum Vapors: The principle point of discussion revolved around whether C4 or C5 and above hydrocarbons should be considered reactive.

There was no resolution of this question. As a result, it was agreed to evaluate the emission inventory using both the 66% (ARB) and 90% (EPA) reactivity factors for petroleum vapors (gasoline, jet fuel, diesel, etc.). It should be noted that these factors do not represent a range per se, rather a choice as to the reactivity of C4 or C5 and above hydrocarbons.

The ARB and EPA Representatives agreed to discuss this matter further and attempt to arrive at some mutually acceptable factor.

ORGANIC SOLVENTS

THC Emissions Factors: The APCD used detailed THC emission factors obtained from the Los Angeles APCD because AP-42 did not have comparable detail.

It was agreed that the Los Angeles APCD emission factors should be used.

RHC Factors: The APCD presented RHC emissions based upon the legal and chemical definition of Rule 66. In addition a calculation was done based upon the composition of the solvents using C5 (ARB data) and above hydrocarbons as reactive.

It was agreed that the calculation based upon the composition of the solvents and assuming C5 and above hydrocarbons as reactive was the most representative evaluation methodology and should be used.

AIRCRAFT

Base Data: The APCD calculated aircraft emissions based upon local LTD data and using EPA emission factors as published in AP-42. There was some discussion concerning the information on the number and kind of engines by aircraft type.

It was agreed to contact TRW, an EPA contractor, for more information concerning aircraft engine information. However, since there were no good information sources identified at the meeting, it was agreed to use the existing data until new information was made available or obtained.

Reactivity Factors: At the present time the ARB considers 50% of aircraft emissions to be reactive while EPA considers 90% of the emissions reactive.

There was no resolution of the question. As a result, it was agreed to evaluate the emission inventory using both the 50% and 90% reactivity factors.

Control Effectiveness: The ARB has been assuming the EPA would control aircraft emissions by 95% by 1977. However, EPA has maintained a 30% reduction can be expected.

It was agreed to use the EPA 30% control figure.

FUEL COMBUSTION (STATIONARY SOURCES)

Reactivity Factors: The APCD assumed the emissions will be 100% reactive. The ensuing discussion revealed that some authorities consider these emissions to exhibit low reactivity. However, it was the consensus that hydrocarbons resulting from any combustion process should be considered reactive.

It was the consensus of opinion, since this is a small source in terms of the total inventory, that a conservative estimate should be made; hence, the 100% reactivity factor will continue to be used.

Turbine Emissions: The APCD was unable to find emission data on turbines. The following discussion revealed that, apparently there is no other information on this subject other than the RAND Corp. estimates.

The consensus was to use the RAND Corp. emission factors for turbine operations.

LIGHT DUTY MOTOR VEHICLES

Vehicle Distribution: There were three distributions discussed, ARB, EPA, and RAND Corp. It was determined that the EPA distribution was a smoothed ARB distribution while the RAND Corp. had used national data.

It was agreed the EPA vehicle distribution as a function of model year was the most appropriate.

Annual VMT Distribution: There were three distributions discussed, ARB, EPA, and RAND Corp. All of these distributions average out to around 7 to 8 thousand miles per vehicle annually. Transportation authorities claim the average should be around 10 thousand miles annually.

Since each of the mileage distributions share the same inadequacy, it was decided to use the RAND Corp. distributions since it was already imbedded in the model. However, it was agreed to proportion the results to reflect the 10 thousand mile average annual mileage.

Low Mileage Emission Factors: There were two sets of emission factors discussed; EPA and RAND Corp. The consensus of opinion was the EPA emission factors, as published in AP-42, were too low for pre-66 vehicles. The RAND Corp. has modified the EPA data to reflect extensive ARB surveillance data. This adjustment, among other things, raised the emissions for pre-66 vehicles.

It was agreed to use the RAND Corp. emission factors since they most closely represent the opinion of the participants.

Degradation Curve: There was little discussion on this subject.

It was agreed to use the RAND Corp. degradation curve which is based on ARB surveillance data.

Exhaust Gas Reactivity: The ARB considers exhaust hydrocarbons to be 75% reactive. EPA considers these emissions to be 77% reactive.

It was agreed to consider automotive exhaust hydrocarbons to be 75% reactive.

Speed Correction Factors: There was much discussion about the appropriateness of using the AP-42 speed correction factors. These curves are based upon limited data.

It was agreed that speed correction factors would not be used. This will avoid presenting an optimistic estimate based upon limited data. In addition, it was observed that increased flow rates (speed) should be considered as a short term effect inasmuch as these high flow rates usually attract traffic which results in an ultimate decrease in speed.

55-65 Retrofit Device Effectiveness: The following device effectiveness was agreed upon.

Pollutant	HC	CO	NO _x
Percent Reduction	25	28	31

66-70 Retrofit Device Effectiveness: The following device effectiveness was agreed upon.

Pollutant	HC	CO	NO _x
Percent Reduction	14	10	50

Mandatory Inspection - Maintenance: This program is to begin initially in the South Coast ACCR. However, it was the groups opinion that this program is an essential part of any retrofit program. There were two figures discussed, the EPA effectivity of 30% initially declining to 0% in one year with an average of 15% effectivity. The ARB evaluation indicates a 10% effectiveness.

It was agreed to use the following Inspection-Maintenance effectiveness.

Pollutant	HC	CO
Percent Reduction	10%	5%

UOP CATALYTIC REACTOR
(LDV)

Vehicles Eligible for UOP Retrofit: It was agreed that the following percent of vehicles by model year would be retrofitable.

Model Year	% of Vehicles Retrofitable
66-70	60
71	75
72-74	95

UOP Device Effectiveness: The following device effectiveness was agreed upon.

Pollutant	THC	RHC	CO	NO _x
Percent Reduction	50%	70%	60%	15%

NOTE: The reactivity of exhaust emissions from a vehicle with a catalytic retrofit device is 46%.

HEAVY DUTY MOTOR VEHICLES

Population Distribution: The ARB agreed to provide the total number of vehicles and the population distribution.

Low Mileage Emission Factors: It was agreed to use EPA emission factors as published in AP-42.

Emission Degradation Factors: It was agreed to use the EPA degradation factors as published in AP-42.

Vehicles Eligible for UOP Retrofit: It was agreed that 92% of gasoline powered HDMV will be under 26,000 pounds CWV and 75% of these will be retrofitable.

Device Effectiveness: It was agreed the same effectiveness as used for LDV would be appropriate.

Exhaust Gas Reactivity: It was agreed the same reactivities as used for LDV would be appropriate.

EMISSION GROWTH FACTORS

Mobile Sources: There was a discussion concerning the use of statewide trends as opposed to data generated specifically for the San Diego AQCR.

It was decided to use locally generated vehicle growth data to be supplied by the County Office of Environmental Management.

Stationary Sources: It was decided to use locally generated per-capita growth rates where appropriate. Data is to be provided by the County Office of Environmental Management.

STRATEGIES TO BE EVALUATED

1. The most recent EPA control strategy.
2. The most recent ARB control strategy using 30% aircraft control.
3. VMT reduction projects as proposed by CPO.
4. Maximal retrofit. ARB and UOP devices.
5. CPO proposed VMT reducing projects and maximal retrofit.

APPENDIX H - PLUME COMPUTATIONS

To estimate the maximum probable effect of mineral industry operations in the Mission Valley area on the particulate readings at the El Cajon monitoring station, a simple Gaussian continuous point source plume dispersion model was utilized. This model, for a source at ground level, is described by the equation:

$$\chi = \frac{Q_1}{\pi \sigma_y \sigma_z \bar{u}}$$

where:

χ = ground level concentration of material (gm/m^3) along the centerline of the plume

Q_1 = source strength (gm/sec)

σ_y, σ_z = standard deviation (m) of material concentration within the plume in the y- and z- directions respectively, as a function of downwind distance.

$\bar{u}$ = average wind speed (m/sec)

The selection of appropriate factors for the computation of maximum expected concentrations was based on Figure H-1, which is a display of point source emissions of particulate matter in San Diego. Each digit displayed represents an emission level in a 5,000 foot square grid which is identified in the accompanying legend. This display is the product of a software package developed by TRW for the San Diego County Air Pollution Control District. The relationship of the grid to geographical features of San Diego is shown in Figure H-2. In addition, the location of the monitoring station at El Cajon is indicated by arrows along the perimeter of the grid in Figure H-1.



Figure H-2. Grid Boundaries for the Emissions Simulator

On the basis of this display, the most significant concentration of point source emissions occurs in the Mission Valley area (denoted by a 7 and a 9 on the emissions grid). If it is assumed that the plume generated by these sources passes directly over the El Cajon site, the appropriate input values are as follows:

$$Q_1 = 100 \text{ grams/second (9.5 tons/day)}$$

$$\bar{u} = 2 \text{ meters/second}$$

$$\text{downwind distance} = 19 \text{ km (12 miles)}$$

$$\sigma_y = 150 \text{ meters}$$

$$\sigma_z = 54 \text{ meters}$$

The resulting predicted maximum concentration attributable to these sources at El Cajon is $21 \mu\text{g}/\text{M}^3$.

To estimate the maximum probable effect of the freeways on the particulate readings at the El Cajon monitoring station, a simple continuous line source dispersion model was utilized. This model, for an infinite line source at the ground, is given by:

$$\chi = \sqrt{\frac{2}{\pi}} \frac{Q_2}{\sigma_z \bar{u}}$$

where χ = concentration of material (gm/m^3) at ground level

Q_2 = source emissions rate ($\text{gm}/\text{sec}/\text{m}$)

σ_z = standard derivation of material concentration within the plume in the z - direction (m), as a function of downwind distance

$\bar{u}$ = average wind speed (m/sec)

Estimated particulate emissions from freeway traffic in San Diego are displayed in Figure H-3. Again, the position of the El Cajon monitoring station with regard to the freeways is indicated by arrows at the perimeter of the grid. Selecting the grid denoted by a 4 as the most probable source, the appropriate input data is as follows:

$$Q_2 = .003 \text{ gm/sec/meter (assuming 100,000 vehicles/day and a 0.43 gm/mile particulate emission factor)}$$

$$\bar{u} = 2 \text{ m/sec}$$

$$\text{downwind distance} = 800 \text{ m (1/2 mile)}$$

$$\sigma_z = 28 \text{ meters}$$

The resulting predicted maximum concentration attributable to this source is $40 \mu\text{g/m}^3$.

APPENDIX I
STUDY CONTACTS

This program was initiated in San Diego on April 16, 1974 at the Comprehensive Planning Organization (CPO) headquarters. The agencies represented were EPA, TRW, Inc., Deleuw, Cather & Company, the California Air Resources Board, the San Diego Air Pollution Control District, and the San Diego County Comprehensive Planning Organization. Several subsequent meetings were held in San Diego and at Durham, North Carolina to discuss progress of the report.

The bulk of the data used in this study came from a limited number of sources. Reports used in the report are listed in the reference section of chapters. In addition, some private conversations are cited where appropriate. These and other contacts are listed below.

Air Pollution Control District of San Diego County
1600 Pacific Highway

San Diego, California 92101 (714) 236-3826

Mr. Norm Schell, Deputy Air Pollution Control Officer

Mr. Rich Sommerville, Assistant to Mr. Norm Schell

Mr. William Louthen, Air Pollution Engineer

Mr. Michael Foley, Air Pollution Data Section

California Department of Transportation, alias CalTrans or Cal Dot.
2829 San Juan Street

San Diego, California 92110

Mr. Carl West, Assistant District Urban Planning Engineer in charge of CalTrans traffic modeling studies, District 11, San Diego (714) 294-5068

Mr. Chad Lambirth, Transportation Planning Section, District 11, San Diego, in charge of projected traffic volumes data files, (714) 294-5116

Comprehensive Planning Organization (CPO)
1200 Third Avenue, Suite 524

San Diego, California 92101

Mr. Arthur Letter, Intergovernmental Coordinator (714) 233-5211

Mr. Lee Johnston, Senior Regional Planner

Mr. Bill Bamberger, in charge of industrial employment growth projections

Mr. Ronald J. Hertel, Associate Transportation Planner

Mr. Stuart Shaffer, Assistant Director of Land Use and Public Facilities Planning

Mr. Michael Aulick

STUDY CONTACTS (continued)

San Diego Environmental Quality Department
202 C Street, EQD 7-A
San Diego, California 92101
Ms. Cordelia Ridenour, Assistant Director

Air Resources Board
1709 Eleventh Street
Sacramento, California 95814
Mr. Daniel Lieberman

State Department of Land Use Programs for San Diego County
1600 Pacific Highway, Mail Station 201
San Diego, California
Mr. Herman Rosenthal, Director

San Diego Unified Port District
3165 Pacific Highway
San Diego, California 92112
Mr. Thomas E. Firle, Environmental Management Coordinator

San Diego Chamber of Commerce
223 "A" Street, Suite 300
San Diego, California
Mr. Lee Grissom

San Diego Gas and Electric Company
Mr. Jon Hardway, Environmental Representative (714) 232-4252, X1795

Planning and Land-Use Committee
State Capitol
Sacramento, California 95814
Mr. Emilio Varanini, Staff Consultant

Planning and Conservation League
1225 8th Street
Sacramento, California
Ms. Melanie Blade

Assembly Select Committee On Open Space Lands
State Capitol
Sacramento, California 95814
Mr. Robert Odland, Consultant

STUDY CONTACTS (continued)

Office of Assemblyman Knox
State Capitol
Sacramento, California
Mr. Tom Willoughby

Chicago Law School
Ms. Alison Dunham, Professor of Law

Region IX, Environmental Protection Agency
100 California Street
San Francisco, California
Ms. Linda Goldman
Mr. Andy Mank

California State Attorney General's Office
San Diego, California
Mr. Foster Knight

Local Agency Formation Commission
San Diego, California (714) 236-2015
Mr. Peter Detwiler, Assistant Executive Officer

Department of Finance
1025 D. Street, Room 498
Sacramento, California 95814
Ms. Pauline P. Sweezy, Population Research Unit

Regional Water Quality Board (San Diego)
6154 Mission Gorge Road, Suite 205
San Diego, California 92120
Mr. Arthur Coe

State Department of Water Resources
849 South Broadway, Room 1201
Los Angeles, California
Mr. Jack Lyman, Public Information Officer

Southern California Metropolitan Water District
1111 West Sunset Boulevard
Los Angeles, California 90054
Mr. Donald Brooks

STUDY CONTACTS (continued)

San Diego Coast Regional Commission
6154 Mission Gorge Road, Suite 220
San Diego, California 92120
Mr. Daniel Gorfain, Director

Solid Waste Management Task Force, County of San Diego
8995 Complex Drive
San Diego, California 92123
Mr. Eric Elliot, Research Analyst

State Water Resources Control Board
1416 9th Street, Room 1015
Sacramento, California 95814
Mr. Raymond Walsh

San Diego County Water Authority
2750 4th Avenue
San Diego, California 92103
Mr. Linden Burzell, General Manager

APPENDIX J

Letter from Frank Covington (EPA/Region IX)
to the Ad Hoc San Diego Air Quality Task Force

7 June 1974

Mr. Richard G. Rypinski, Chairman
San Diego Air Quality Task Force
Security Pacific Plaza, Suite 524
1200 Third Avenue
San Diego, CA 92101

Dear Mr. Rypinski:

On May 6, 1974, I met with the San Diego Air Quality Task Force to outline preliminary EPA thinking on institutional arrangements for Indirect Source Review, Parking Facility Review and Parking Management Plans. As we stressed on May 6, EPA's policy is to delegate these land use related functions to local government whenever possible.

We look to the members of the San Diego Air Quality Task Force to develop a consensus among the area's local governments on how these functions should be delegated without further fragmenting local decision-making on air quality related land use matters. We anticipate delaying delegations until the policy group advises us on the following:

- (1) Would all the cities and the County participate in the plan development and request delegation?
- (2) At what level of government will the Parking Management Plans be developed and the Indirect Source and Parking Facility Reviews be conducted? Who will resolve inter-jurisdictional conflicts among Parking Management Plans within the air basin? Which agency(s) would be responsible for taking the lead in insuring that these three functions are carried out?

-2-

For your information, we have enclosed a copy of EPA Region IX's current thinking on one approach to implementing these functions. This proposal is merely a more refined version of our presentation to you on May 6. We would, of course, be interested in knowing of any changes in this proposal that the Task Force would advise in the San Diego air basin. Upon receiving an early response from the Task Force, EPA Region IX will assist to the extent possible in carrying out these functions.

Sincerely,

Frank M. Covington, Director
Air and Water Programs

Enclosure

cc: Members of the Task Force Policy Committee:

Mayor Wilson
Supervisor Conde
Mayor Richardson
Mr. Lawrence Cox
Dr. Brage Golding

APPENDIX K

1. Opinion of the State of California Attorney General
concerning APCD indirect source review authority. (p K-1,15)
2. Opinion of the State of California Fourth District
Court of Appeal, Western Oil and Gas Association, et al, v.
Orange County Air Pollution Control District, et al.
(p K-16,27)

EVELLE J. YOUNGER
ATTORNEY GENERAL

STATE OF CALIFORNIA



OFFICE OF THE ATTORNEY GENERAL

Department of Justice

555 CAPITOL MALL, SUITE 550
SACRAMENTO 95814

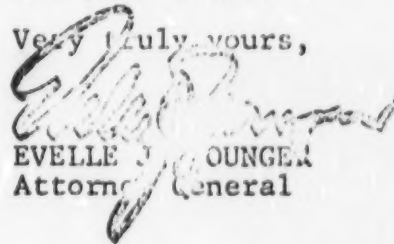
December 17, 1973

Honorable John A. Maga
Executive Officer
Air Resources Board
1025 P Street
Sacramento, California 95814

Dear Sir:

Enclosed is our Opinion No. SO 73/43 issued
to you in accordance with your request.

Very truly yours,


EVELLE J. YOUNGER
Attorney General

EJY:bam
Enclosure

K-1 - a

OFFICE OF THE ATTORNEY GENERAL
State of California

EVELLE J. YOUNGER
Attorney General

OPINION

of

EVELLE J. YOUNGER
Attorney General
E. ROBERT WRIGHT
Deputy Attorney General

No. SO 73/43

DECEMBER 18, 1973

The Honorable John A. Maga, Executive Officer,
State Air Resources Board, has requested an opinion on the
following question:

Are California's county, regional, and bay area
air pollution control districts authorized to regulate com-
plex sources of air pollution for the purpose of denying
authority to construct such sources where the emissions
resulting from vehicular traffic, and other activities
indirectly generated by such sources, would prevent the
attainment or maintenance of a federal or state air quality
standard?

The conclusion is:

California's air pollution control districts
presently are authorized to regulate complex sources of air
pollution for the purpose of denying authority to construct
such sources where the emissions indirectly generated by
such sources would prevent the attainment or maintenance of
federal or state air quality standards.

ANALYSIS

Complex sources are facilities such as airports, highways, shopping centers, and sports complexes which may not themselves create emissions but may affect air quality indirectly by means of the secondary activities (such as vehicular traffic) associated with them.^{1/}

The analysis herein will first focus on the Federal Clean Air Act of 1970. Then, because there are three different types of agencies (county, regional, and bay area) in California with similar statutory provisions vesting authority in them to regulate activities causing air pollution, the authority of each agency to regulate complex sources in order to attain federal and state air quality standards will be considered in turn.

Major attention will be given to the county air pollution control districts. Generally, conclusions regarding the authority of the county air pollution control districts to regulate complex sources are applicable also to the Bay Area Air Pollution Control District and regional districts although at this time there are no regional air pollution control districts in existence. The distinctions between the agencies with respect to regulation of complex sources are primarily in terms of geographical boundaries rather than in terms of the extent of regulatory authority.

It should be kept in mind for the sake of clarity that the air pollution control districts have explicit statutory authority recognized by the courts to regulate direct stationary sources of emissions, such as factories with smokestacks. Orange County Air Pollution Control Dist. v. Public Utilities Com., 4 Cal.3d 945, 953 (1971). Analysis is necessary only because the California air pollution control laws nowhere state in so many words that the air pollution control districts may regulate complex sources.

I

Federal Requirements Specifying the Means by Which Federal Air Quality Standards Will Be Attained and Maintained

The question of whether California's air pollution control districts have the authority to regulate complex

1. See 38 Fed. Reg. 6279-80 (Mar. 8, 1973) and 38 Fed. Reg. 15836-37 (App. O) (June 18, 1973).

sources for the purpose of denying authority to construct such sources must begin with an examination of the Federal Clean Air Act (of 1970) (42 U.S.C. § 1857 et seq.). Under the Federal Clean Air Act, the state is responsible for submitting an implementation plan to specify the means by which the national ambient air quality standards promulgated by the Administrator of the Environmental Protection Agency (hereinafter EPA) will be achieved and maintained throughout each air quality region within the state. 42 U.S.C. § 1857c-2. California's original implementation plan was submitted by the State Air Resources Board on January 30, 1972.

The objectives of the Federal Clean Air Act are "to protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare and the productive capacity of its population; . . ." 42 U.S.C. § 1857(b) (1). The prevention of air pollution at its source remains the primary responsibility of state and local government. 42 U.S.C. § 1857(a) (3).

Under the Federal Clean Air Act, the EPA Administrator is required to promulgate national ambient air quality standards. 42 U.S.C. § 1857c-4. Each state must then submit a plan within nine months after the promulgation of the federal standards for implementation of the standards within the state. 42 U.S.C. § 1857c-5(a) (1). The plan must provide for the attainment of federal standards as expeditiously as practicable. 42 U.S.C. § 1857c-5(a) (2) (A). The plan must include "emission limitations . . . and such other measures as may be necessary to insure attainment and maintenance of . . . [the federal standards] including but not limited to, land use and transportation controls." 42 U.S.C. § 1857c-5(a) (2) (B). (Emphasis added.)

In Natural Resources Defense Council, Inc. v. Environmental Protection Agency, 475 F.2d 968 (D.C. Cir. 1973), the court ordered:

"That [state implementation] plan must satisfy each and every requirement of Sections 110(a) (2) (A) through (H) if it is to be approved by the Administrator. In particular, it must provide for the attainment of the primary standard as expeditiously as practicable but in no case later than May 31, 1975, and it must include emission limitations, schedules, and timetables for compliance with such limitations, and such other measures as may be necessary to insure attainment and maintenance of such primary or secondary standard, including, but not limited to, land-use and transportation controls." 475 F.2d 968, 970-71. (Emphasis by the court.)

Prior to the decision in Natural Resources Defense Council, Inc. v. Environmental Protection Agency, *supra*, the EPA Administrator had required each state implementation plan to set forth a "control strategy" which would provide for the necessary emission reductions in order to attain the applicable federal standards. 40 C.F.R. § 51.12 (1972). "Control strategy" is defined as the combination of measures designed to achieve the requirements set by national standards including any land-use or transportation control measures not specifically set forth. 40 C.F.R. § 51.1(n) (9) (1972). The EPA Administrator had required each implementation plan to show that the state had legal authority to prevent the construction of a stationary source if emissions from the source would prevent the attainment or maintenance of a federal standard. 40 C.F.R. § 51.11(a) (4) (1972). See also 40 C.F.R. § 51.18 (1972).

The court in Natural Resources Defense Council, Inc. v. Environmental Protection Agency, *supra*, ordered the EPA Administrator to disapprove state implementation plans which do not provide the measures necessary to maintain federal standards. The EPA Administrator thereafter noted that maintenance of standards had been partially insured by 40 C.F.R. § 51.18 which states that each state plan must provide authority to review and if necessary prevent the construction of stationary sources if emissions from such sources will interfere with the attainment or maintenance of national standards. 38 Fed. Reg. 6279 (Mar. 8, 1973). The EPA Administrator said that such measures, by themselves, are not adequate to insure the maintenance of the national standards, particularly with respect to pollutants emitted by motor vehicles and emission sources associated with general urban and commercial development. The EPA Administrator continued:

"Accordingly, in order to comply with the court order, it has been determined that all State plans must be disapproved to the extent that they do not contain provisions which will permit the review, and provide the authority to prevent, the construction, modification, or operation of complex sources at a location where emissions associated with such source would result in violation of a national standard or the State's control strategy." 38 Fed. Reg. 6279 (Mar. 8, 1973).

The current EPA position appears to be a reasonable interpretation of congressional intent. Congress expressly provided for emission limitations in state implementation plans which pertain to direct sources of emissions. In going on to provide that the plans are to contain such

other measures, including land-use and transportation controls, as are necessary to insure attainment and maintenance of federal standards, Congress used broad language indicating an intention that indirect as well as direct sources must be regulated, where necessary.

The EPA Administrator promulgated amendments to the federal regulations which require an implementation plan to show that the state has legal authority to prevent the construction of complex sources in addition to "traditional stationary sources", where such complex sources would interfere with the attainment or maintenance of the national standards. 40 C.F.R. §§ 51.11(a) (4), 51.18; 38 Fed. Reg. 15836 (June 18, 1973).

II

The Legislative Authority of the County Air Pollution Control Districts to Regulate Complex Sources in Order to Attain or Maintain Federal and State Air Quality Standards

A. Statutory Language

The first issue to be considered is whether the county air pollution control districts have the authority to regulate for the purpose of preventing construction of complex sources as required by the new federal regulations.

The County Air Pollution Control Law (California Health and Safety Code section 24198 et seq.)^{2/} was enacted in 1947 and was the first detailed state legislation dealing with air pollution. The purposes of the County Air Pollution Control Law include creating county air pollution control districts with regulatory power to reduce air contaminants in order to safeguard life, health, property, and public welfare, and make possible the comfortable enjoyment of life and property. § 24199 subd. (d). The Legislature also declared that the people of the state have a primary interest in freedom of the air from air contaminants. § 24198.

Section 24260 of the County Air Pollution Control Law as originally enacted gave county air pollution control boards authority to make and enforce all needful orders, rules and regulations necessary or proper to accomplish the purposes of the law, the administration of the district,

2. Hereinafter all statutory citations are to sections of the Health and Safety Code unless otherwise indicated.

and to perform all other acts necessary or proper to accomplish the purposes of the chapter. (Stats. 1947, ch. 632, § 1, p. 1645.)

In 1967 the Legislature enacted the Mulford-Carrell Air Resources Act (§ 39000 et seq.), which created the State Air Resources Board (hereinafter referred to as board) and divided responsibility for the regulation of air quality between the board and county and regional boards. After the adoption of the Mulford-Carrell Act, section 24260 was amended to not only give the county air pollution control districts authority to make and enforce needful orders, rules, and regulations necessary or proper for accomplishment of the purposes of the County Air Pollution Control Law, but also those necessary or proper for accomplishing all provisions of part 1 of the Mulford-Carrell Air Resources Act relating to nonvehicular sources of air contaminants. As presently worded, section 24260 provides as follows:

"The air pollution control board of an air pollution control district may make and enforce all needful orders, rules, and regulations necessary or proper for the administration of the district and to accomplish the purposes of this chapter and all provisions of Part 1 (commencing with section 39000) of Division 26 relating to nonvehicular sources of air contaminants, and may perform all other acts necessary or proper to accomplish the purposes thereof." Stats. 1947, ch. 632; amended Stats. 1972, ch. 577.

Significant provisions of part 1 of the Mulford-Carrell Air Resources Act are summarized or quoted below.

The purposes of the Mulford-Carrell Air Resources Act include: (a) providing a means for an intensive coordinated state, regional, and local effort to combat the problems of air pollution within the various air basins in the state by dividing the state into basins; (b) providing the state authority to establish ambient air quality standards that could vary from basin to basin as well as statewide motor emission standards; and (c) providing for control of emissions from nonvehicular sources. § 39011. Local and regional authorities are given the primary responsibility for the control of air pollution except for the emissions from motor vehicles, and these authorities are to control emissions from nonvehicular sources. § 39012. The Legislature further declared that the state authority shall undertake enforcement activities only after it has determined that the local regional authorities have failed to meet their responsibilities. § 39012. The state board is empowered, inter alia, to adopt standards of ambient air

quality for each basin. § 39051 subd. (b). And under certain limited conditions the state board may adopt emission standards for all nonvehicular air pollution sources for application for each basin. § 39051 subd. (d).

Section 39052 subdivision (f) of the Mulford-Carrell Air Resources Act empowers and directs the board to "[r]eview rules and regulations of local or regional authorities . . . to assure that reasonable provision is made to control emissions from nonvehicular sources and to achieve the air quality standards established by the board." (Emphasis added.) Under a 1970 amendment to section 39052 subdivision (f), if the board "finds . . . that any rule or regulation of a local or regional authority submitted to it will not achieve applicable air quality standards, it may repeal such rule or regulation and promulgate a rule or regulation which it finds would achieve such standards", and the board's rule or regulation shall then be enforced by the local or regional authority.

In 1970 the Legislature also added provisions to the Mulford-Carrell Air Resources Act requiring the establishment of a Basinwide Air Pollution Control Coordinating Council in each air basin in which there is not a single regional district with boundaries coterminous with those of the air basin (§§ 39270-39272), and directed that each basinwide regional district and each such Basinwide Air Pollution Control Coordinating Council shall establish and submit to the board a coordinated basinwide air pollution control plan. The plan "shall include emission standards and enforcement procedures which will within a reasonable time achieve or exceed the air quality standards established by the board for that air basin." (Emphasis added.) § 39273. The plan was to be submitted to the board by no later than January 1, 1972, and provision is made for review and revision of the plan by the basinwide regional district or council. § 39273. The 1970 amendments further provide:

"If the board finds that any original or revised coordinated basinwide air pollution control plan . . . will not achieve the air quality standards established for that basin, or if no timely original or revised plan has been submitted, the board shall establish a coordinated basinwide air pollution control plan which would achieve the standards in effect for that basin. Such plan shall include emission standards and rules and regulations, which shall be enforced by the basinwide regional air pollution control district or, if no basinwide regional district is functioning in that basin by all local and regional authorities

within that basin. If the board finds that reasonable action to enforce that plan has not been taken, . . . the board may take any appropriate legal action to enforce any such plan, including the emission standards and enforcement procedures therein" (Emphasis added.) § 39274.

The 1970 amendments also provide that:

"On or before January 1, 1972, each county district all or part of which lies within an air basin shall submit to the board a program to implement the air pollution control plan of the basin within that county district. If the board finds that the program will not achieve the air quality standards established for the basin, or if no program is submitted . . . , the board may exercise the powers of the county air pollution control district within the basin." (Emphasis added.) § 39275.

Despite the above legislation and similar legislation in other states, it was noted after the enactment of the Federal Clean Air Act that it was doubtful whether any state could meet such federal requirements as provision for land-use and transportation controls without enacting new legislation. T. A. Trumbull, Federal Control of Stationary Source Air Pollution, 2 Ecology Law Quarterly 283, 311 (1972).

In 1972 the Legislature added section 39276 to part 1 of the Mulford-Carrell Air Resources Act which provides that:

"The board and the air pollution control districts shall endeavor to attain not only the ambient air quality standards established by the board pursuant to subdivision (b) of Section 39051, but also the ambient air quality standards established by the Environmental Protection Agency pursuant to Section 1857c-4 of Title 42 of the United States Code. The board may order, pursuant to Section 39273, review of a coordinated basin-wide air pollution control plan for revision to attain federal ambient air quality standards in the basin, as part of the state implementation plan required under Section 1857c-5 of Title 42 of the United States Code. Such revision shall be filed with the board within 60 days of the request of the board, and the air pollution control districts shall adopt rules and regulations implementing such plans within 60 days after final adoption

by the board pursuant to Section 39274."
(Emphasis added.)

In interpreting section 39276, it is reasonable to assume that the Legislature would not direct the air pollution control districts and the board to endeavor to attain federal ambient air quality standards if their authority to do so were lacking.

Thus the Mulford-Carrell Air Resources Act authorizes establishment of state ambient air quality standards by the board (§ 39052), directs in substance the districts to achieve applicable air quality standards (see §§ 39052 subd. (b), 39273, 39274, and 39275), directs the board and the districts to endeavor to attain both the ambient air quality standards established by the board and also the federal ambient air quality standards established by the Environmental Protection Agency, and authorizes revision of coordinated basinwide plans to attain federal ambient air quality standards, as part of the state implementation plan. § 39276. The County Air Pollution Control Law authorizes the districts to make and enforce rules and regulations necessary or proper to accomplish the purposes of the County Air Pollution Control Law and all provisions of part 1 of the Mulford-Carrell Air Resources Act relating to nonvehicular sources of air contaminants. § 24260; see also § 24262.

Accordingly, we conclude that air pollution control districts have broad authority to adopt rules and regulations necessary to implement the state and federal ambient air quality standards, including regulation of complex sources where such regulation is necessary to attain state or federal air quality standards. The extent of such regulatory authority would logically include the ability to prohibit the construction of complex sources.

B. Legislative History

Section 39276 was added to the Health and Safety Code by A.B. 580, Statutes 1972, chapter 949, which contained an urgency clause, and became effective August 16, 1972. The legislative history of section 39276 supports the conclusion that the county air pollution districts are authorized to regulate complex sources. The facts constituting the urgency are:

"In order that the State Air Resources Board and the air pollution control districts may exercise the additional authority that would be conferred on them by this act at the earliest possible time for the control of air pollution within the state, it

is necessary that this act take effect immediately."
(Emphasis added.)

Prior to amendment of the urgency clause on June 16, 1972, the facts constituting the urgency had been stated in A.B. 580 as follows:

"In order for this act to become effective in time so that the Environmental Protection Agency may consider the provisions thereof when it completes its review in May 1972 of California's implementation plan to attain required federal ambient air quality standards within the state, it is necessary that this act take effect immediately." A.B. 580 (Reg. Sess., Feb. 28, 1972, last amended June 16, 1972).

A.B. 580 was originally intended to be enacted in time for EPA review of the state implementation plan. The circumstances indicate that the purpose of A.B. 580 was to clarify and strengthen the authority of the state board and the districts to fulfill the state's responsibility under the Federal Clean Air Act and to obtain EPA approval of the state implementation plan.^{3/}

3. The Committee Bill Analysis of A.B. 580 as amended April 4, 1972, states that:

"California's implementation plan is being reviewed in May, 1972, by the EPA; changes in the California code have been recommended to meet the federal guidelines requiring necessary authority to be held by the ARB [board] and counties and to meet federal guidelines for ambient air quality standards. The EPA and Attorney General have expressed doubts as to whether this authority is adequately expressed in our existing laws." Bill Analysis, A.B. 580, Assembly Committee on Environmental Quality (April 17, 1972).

Likewise, the Legislative Analyst said with respect to A.B. 580 that:

"Present state law requires that attainment of Ambient Air Quality Standards through the establishment of coordinated basinwide air pollution control plans. These plans to satisfy state standards already have been developed, modified, and approved by the State Air Resources Board (ARB)

Broad delegations of authority to administrative agencies charged with the responsibility of dealing with complex economic, social, or technologic problems, are not uncommon and have been upheld by the courts. See Holloway v. Purcell, 35 Cal.2d 220, 230-32 (1950), cert. denied 340 U.S. 883; Jersey Maid Milk Products Co. v. Brock, 13 Cal.2d 620, 658 (1939); Butterworth v. Boyd, 12 Cal.2d 140, 148-49 (1938); Lloyd A. Fry Roofing Co. v. State Department of Health Air Pollution Variance Board, 499 P.2d 1176 (Colo. 1972), upholding a broad delegation of authority to a state air pollution control agency.

The legislative policy and purpose sections of the Federal Clean Air Act and the state air pollution control laws provide adequate legislative guidance for administrative action.

To conclude that the districts have the authority to regulate complex sources where necessary to achieve or maintain federal air quality standards, is to interpret such sections as 39276 and 24260 consistently with the policy and operative sections of the state acts (County Air Pollution Control Law and Mulford-Carrell Air Resources Act) and the policy and operative sections of the Federal Clean Air Act.

C. Construction of Environmental Acts

Legislation concerning environmental protection is given broad construction to accomplish the objectives of such enactments. Thus, in Friends of Mammoth v. Board of Supervisors, 8 Cal.3d 247 (1972), the Supreme Court at page 254 stated:

"More recently, a circuit court discussed statutes attesting to the commitment of the

Footnote 3 continued:

and submitted to the Environmental Protection Agency (EPA). The federal Clean Air Amendments of 1970 added newer and more stringent controls which the states are required to possess.

"This bill would add three new sections to the Health and Safety Code to clarify and strengthen the ARB's authority as follows:" Analysis of A.B. 580 as amended in Senate June 16, 1972, Legislative Analyst (June 26, 1972).

Government to control, at long last, the destructive engine of material "progress". The duty of the judiciary, it held, is to assure that important environment purposes, heralded in legislative halls, are not lost or misdirected in the vast hallways of administrative bureaucracy."

We think the Legislature intended that section 39276 and the other provisions of the state air pollution control laws discussed above be given a broad construction in order to combat the evil of air pollution to which the legislation is directed. See Friends of Mammoth v. Board of Supervisors, supra, 8 Cal.3d at 259.

III

The Authority of the Air Pollution Control Districts to Indirectly Regulate Vehicular Emissions in the Course of Regulating Complex Sources

An additional problem is presented by the fact that regulation of complex sources operates in part as an indirect regulation of vehicular emissions. Local and regional authorities have the primary responsibility for the control of nonvehicular sources. § 39012. Part 1 of the Mulford-Carrell Air Resources Act provides a comprehensive scheme for regulation of vehicular emissions by the board. The board is expressly authorized to adopt emission standards for vehicles. § 39052.

This office has previously concluded that the Legislature did not intend air pollution control districts to supersede board regulation of vehicular emissions. Letter to Honorable Pete Schabarum, Assemblyman, 49th District, Feb. 17, 1972, I.L. 72-37, L.B. No. 382, p. 30. However, this office has also concluded that other control measures are within the primary jurisdiction of the air pollution control districts and that "indirect measures ultimately aimed at reduction of vehicular emissions" must in the first instance be undertaken by the air pollution control districts before the board may intervene. Letter to Honorable Nicholas C. Petris, Senator, 11th District, Mar. 8, 1971, I.L. 71-73, L.B. No. 381, p. 47. This delineation of the board's authority has been upheld. In Environmental Defense Fund, Inc. v. Air Resources Board, 30 Cal.App.3d 829 (1973), the court held that the primary jurisdiction of the board in regulating motor vehicle emissions is limited to regulation of the pollutants that come out of the motor vehicle and that the board cannot regulate fuel composition.

This office has also expressed the view that the authority of the board to regulate vehicular emissions does not preempt county air pollution control districts under their broad powers from stopping vehicular traffic in emergencies. Letter to Highway Patrol Commissioner H. W. Sullivan, Jan. 28, 1972, I.L. 72-18, L.B. No. 382, p. 17.

Despite the indirect effect on vehicular emissions, the initial authority to regulate complex sources would appear to be vested in the air pollution control districts. The authority of the board with respect to regulation of complex sources appears to be to review local plans and implementation programs for their adequacy, to establish plans when local plans are found by the board to be inadequate, and to enforce plans when local plans or programs are found by the board to be inadequately enforced. See §§ 39052 subd. (f), 39274, 39275 and 39276.

IV

The Legislative Authority of the Bay Area
Air Pollution Control District and the
Regional Districts to Regulate Complex
Sources in Order to Attain or Maintain
Federal and State Air Quality Standards

The Bay Area Air Pollution Control District and regional air pollution control districts also have the authority to regulate complex sources where necessary to achieve or maintain federal or state ambient air quality standards.

Section 24354.2 was enacted as part of the Bay Area Air Pollution Control Law of 1955. As amended in 1972, it provides:

"The district shall do such acts as may be necessary to carry out the provisions of this chapter and all provisions of Part 1 (commencing with Section 39000) of Division 26 relating to nonvehicular sources of air contaminants."

Section 39382 pertaining to regional air pollution control districts was enacted in 1967 as part of part 2 of the Mulford-Carrell Air Resources Act. As amended in 1972, it is identical to section 24354.2. These sections are comparable to section 24260 of the County Air Pollution Control Law. Other sections of the Health and Safety Code also confer broad rule-making authority on the Bay Area Air Pollution Control District (see e.g., §§ 24362, 24362.1, 24362.3 and 24350.5), and on regional districts (see e.g.,

§ 39460).4/ Also see sections 24354.1 and 39381 which provide that the Bay Area Air Pollution Control District and the regional districts respectively shall establish an effective program for the reduction for air contaminants in the district.

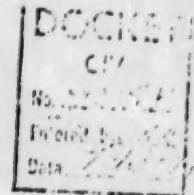
These sections together with those provisions of part 1 of the Mulford-Carrell Air Resources Act discussed above confer authority upon the Bay Area Air Pollution Control District and the regional districts to regulate complex sources by denying authority to construct where necessary to achieve or maintain federal or state ambient air quality standards.

Our conclusion is that the county, regional, and bay area air pollution control districts have the authority to regulate complex sources including authority to prohibit construction of complex sources where the emissions indirectly generated by such sources would prevent the attainment or maintenance of federal or state ambient air quality standards.

XXXXXXXXXX

4. This office has previously expressed the view that in order to reduce or alleviate the air pollution within the district, the Bay Area Air Pollution Control District may adopt general performance standards which, if reasonable and uniform, may be such that certain types of residential or commercial development may be inhibited or entirely prohibited. Letter to Honorable John A. Maga, Executive Officer, State Air Resources Board, October 6, 1971, I.L. 71-23, L.B. No. 381, p. 144. This conclusion was based on the rule-making authority conferred on the Bay Area Air Pollution Control District by sections 24362, 24362.1 and 24362.3.

PUBLICATION
COURT OF APPEAL, FOURTH DISTRICT
SECOND DIVISION
STATE OF CALIFORNIA



CLERK OF APPELLATE COURT
FILED
JUL 1 1974
JAMES E. TUSTENBERG, CLERK

WESTERN OIL & GAS ASSOCIATION,
et al.,

Plaintiffs and Respondents,

-v-

ORANGE COUNTY AIR POLLUTION
CONTROL DISTRICT, et al.,

Defendants and Appellants.

4 Civil 13466
(Sup.Ct.No. 191239)

O P I N I O N

APPEAL from a judgment of the Superior Court of Orange
County. James F. Judge, Judge. Affirmed.

Adrian Kuyper, County Counsel, and John F. Powell,
Deputy County Counsel for Defendants and Appellants.

Evelle J. Younger, Attorney General, Robert H. O'Brien,
Assistant Attorney General, Nicholas C. Yost, C. Foster Knight
and Jan E. Chatten, Deputy Attorneys General, as Amici Curiae on
behalf of Defendants and Appellants.

McCutchen, Black, Verleger & Shea, Philip K. Verleger,
Jack D. Fudge, and David A. Destino for Plaintiffs and Respon-
dents.

In October 1971, the Orange County Air Pollution Control District ("District") adopted Rule 74. The purpose of the rule was to eliminate the lead content in gasoline sold in Orange County over a three year period commencing July 1, 1972 and ending July 1, 1975.^{1/}

In March 1972, Western Oil and Gas Association, a non-profit corporation, and several of the major oil companies doing business in California filed suit in the superior court seeking declaratory and injunctive relief against enforcement of the rule.

In July 1973, the case came on for trial on stipulated facts, stipulated exhibits and depositions. The court held that

1/ Rule 74 states, in part:

"B. 1. No retailer shall sell any gasoline having an octane number of 96 or more containing lead exceeding the following: on or after July 1, 1972, 3.0 grams per gallon; on or after July 1, 1973, 2.0 grams per gallon; on or after July 1, 1974, 1.0 grams per gallon; on or after July 1, 1975, traces.

"2. No retailer shall sell any gasoline having an octane number of less than 96 containing lead exceeding the following: on or after July 1, 1972, 0.5 grams per gallon; on or after July 1, 1973, 0.1 grams per gallon; on or after July 1, 1974, traces.

"3. Every manufacturer of gasoline and every retailer of gasoline shall sell at least one grade of gasoline having an octane number of not less than 90 and containing lead not exceeding the following: on or after July 1, 1972, 0.5 grams per gallon; on or after July 1, 1973, 0.1 grams per gallon; on or after July 1, 1974, traces.

"Retailer," as used in this Rule means any person possessing a valid motor fuel pump license issued pursuant to the California Business and Professions Code Section 20767."

the primary purpose and effect of the rule was to control the emissions of lead from motor vehicles; that under section 39012 of the Health and Safety Code, county districts are authorized to control ". . . air pollution except for the emissions from motor vehicles"; that Rule 74 is null and void and its enforcement is enjoined. The District challenges this ruling.

California is the only state which had adopted an ambient air quality standard for lead. (Cal. Admin. Code, tit. 17, § 70200.) The standard is 1.5 micrograms of lead per cubic meter as a 30 day average. This standard was adopted in November 1970 by the California Air Resources Board to protect public health. The State Department of Public Health found that concentrations of lead above 1.5 micrograms per cubic meter are associated with increased storage of lead in human bodies which, in turn, produces detectable metabolic effects.

Thirty day average lead levels as high as 8.2 micrograms per cubic meter have been measured in Los Angeles County. Orange County measurements of 30 day averages show as high as 6 micrograms per cubic meter.

The major source of lead in California's air is the emission of lead from motor vehicles due to the combustion of lead and anti-knock compounds in gasoline. More than 90 percent of the gasoline sold in the state is for highway vehicular use.

The California Air Resources Board has determined that an 80 percent reduction in lead emissions from motor vehicles is necessary to attain the statewide ambient air quality standard for lead.^{2/}

The most effective way to reduce lead emissions from motor vehicles is to reduce or eliminate the lead content in gasoline. While there are other ways of reducing lead emissions, such as requiring the installation of lead trap devices on motor vehicles, the effectiveness of these types of structural alterations is debatable.

This appeal raises the single issue of whether the District can validly regulate the lead content of gasoline used in automobiles or other motor vehicles.

Controlling the resolution of this question is the principle that the District, as a regulatory agency, can regulate only what the Legislature says it can regulate, and can do so only in the manner prescribed by the Legislature. It has no authority to enact rules or regulations which enlarge the terms of the legislative enactments which give it existence and power.

^{2/} In December 1973, the Environmental Protection Agency promulgated regulations concerning lead additives in gasoline. (38 Fed. Reg. 33734.) By the terms of the Clean Air Act, the promulgation of these regulations by EPA preempted the field of leaded gasoline regulation throughout the United States except for the State of California. (42 U.S.C.A. 1857f-6c(c) (4) (D).)

(California Sch. Employees Assn. v. Personnel Commission, 3 Cal.3d 139; Morris v. Williams, 67 Cal.2d 733; Ellis v. Board of Education, 27 Cal.2d 322; Whitcomb Hotel, Inc. v. Cal. Emp. Com., 24 Cal.2d 753; Environmental Defense Fund v. California Air Resources Bd., 30 Cal.App.3d 829; People v. Harter Packing Co., 160 Cal.App.2d 464.) From this it follows that, in order to define the limits of the District's power, we must inspect the statutes which spell out those boundaries.

The trial court rested its decision primarily on section 39012 of the Health and Safety Code. This measure in question, enacted in 1967, is one of the prefatory sections of the Mulford-Carrell Air Resources Act. It pronounces the policy which the Legislature proposed to follow in fighting the evils of air pollution. It provides: "Local and regional authorities have the primary responsibility for the control of air pollution except for the emissions from motor vehicles. These authorities may control emissions from nonvehicular sources. . . ."

It is difficult to imagine a plainer statement of what a state-created agency can and cannot do. It is to the litigant District and to similar agencies that the term "local and regional authorities" refers (see § 39009.5). With the District specifically in mind, the Legislature has said that such entities "may control emissions from nonvehicular sources" to whatever extent

they deem advisable. What they may not do is to deal with "emissions from motor vehicles." So much is clearly the "substance contained". in section 39012 (Code Civ. Proc., § 1858). But this apparently is not clear to the District.

It is the contention of the District that its rule does not fall under the ban of section 39012 because it does not control automobile emissions; it "merely" regulates fuel content. While this proposition is offered in all seriousness, it is not a serious argument. The parties have stipulated that "the only significant effects of regulating the lead content of . . . gasoline sold for highway vehicle use are to reduce from highway vehicles the emission or discharge of lead into the atmosphere and to extend the life of catalytic afterburners in automobiles" (which are themselves emission control devices). Given that the only significant effect of controlling lead content is the control of exhaust emissions, it is specious to argue that Rule 74 is anything but an attempt to do what the higher authority of section 39012 forbids to be done.

Taking another tack, the District contends that it does have the power to regulate fuel, after all, regardless of what section 39012 says. This claim is based upon the language of a 1957 enactment, section 24263.7 of the Health and Safety Code, which provides: "The air pollution control board by

regulation may: (a) Establish standards of performance for any article, device, equipment, or method specifically designed or intended for installation or use upon or in any motor vehicle as defined in the Vehicle Code, for the purpose of eliminating, reducing or controlling the issuance of air contaminants. [¶]

(b) Prohibit the sale, offering for sale or installation of any article, device, equipment or method specifically designed or intended for installation or use upon or in any motor vehicle as defined in the Vehicle Code to eliminate, reduce, or control the issuance of air contaminants, unless such article, device, equipment or method is of a type which has been submitted to and approved by the air pollution control officer as meeting the minimum standard of performance as authorized in this section.

Upon approval the air pollution control officer shall issue a permit authorizing the sale, offering for sale or installation of any said approved article, device, equipment or method referred to in this section." (Emphasis added.) We cannot agree that this statute empowers the District to control gasoline content. It is abundantly clear that gasoline is in no sense an "article, device, equipment or method specifically designed or intended" to "eliminate, reduce, or control the issuance of air contaminants." It is fuel, pure and simple; far from reducing air pollution, fuel causes it; and fuel is not what this piece

of legislation is concerned with. The statute parcels out power to control standards, sales, and installations of what, in the parlance of air pollution control, is referred to as "hardware" -- structural additions to or modifications of motor vehicle parts. Since section 24263.7 has nothing to do with what goes into gasoline, it cannot be used to sustain Rule 74.^{3/}

Trying essentially the same approach, but using a different piece of legislation, the District asserts that its rule is a valid one because based on section 24262 of the Health and Safety Code. This states: "Whenever the air pollution control board finds that the air in the air pollution control district is so polluted as to cause any discomfort or property damage at intervals to a substantial number of inhabitants of the district, the air pollution control board may make and enforce such orders, rules, and regulations as will reduce the amount of air contaminants released within the district." At first glance, the statute seems to do everything the District says it does. It is as broad and flexible as the "elastic clause" of

^{3/} It is, in any event, doubtful whether section 24263.7, while still on the books, is still in effect. The enactment of the Air Resources Act of 1967 (Health & Saf. Code, § 39000 et seq.) appears to repeal it sub silentio, and to transfer the powers therein created to the Air Resources Board. In light of our construction of the statute, however, we need not reach the question of its continuing force.

the United States Constitution. But it is also dead letter. Regardless of what the Legislature may have intended in 1947, when section 24262 was enacted, it can no longer be considered the law in light of the subsequent enactment of section 39012, which gives the air pollution control districts a more limited role in the battle against air contamination. It is a familiar proposition that, where the Legislature passes contradictory statutes, the later in time controls. (County of Ventura v. Barry, 202 Cal. 550; People v. Dobbins, 73 Cal. 257.) The passage of section 39012 repealed section 24262 by implication.

But, argues the District, the decision in Environmental Defense Fund v. California Air Resources Bd., supra, 30 Cal.App.3d 829, changes all this. In that case, the court held that the California Air Resources Board had no authority, under any provision of the Air Resources Act of 1967 or the Pure Air Act of 1968, to regulate the lead content of gasoline. Had the Legislature known that this was going to happen to the state-wide board, contends the District, it would at the very least have left the 1947 powers of the local air pollution control districts untouched when it passed the Air Resources Act (of which section 39012 is a part) in 1967. While this may be true (as it may also be false), this court is unaware of any authority for importing the principle of dependent relative revocation

from the law of wills into the rules of statutory interpretation. Our touchstone here is the intent of the Legislature. (Code Civ. Proc., § 1859; People v. Superior Court, 70 Cal.2d 123.) We are concerned with analysis of what the Legislature did do, not with attempts to predict what would have happened in a hypothetical past had the Legislature enjoyed powers of prevision. We decline to indulge in this sort of speculation.

The actual intent of the Legislature as to what the power of the air pollution control districts shall be is discernible from more sources than simply section 39012. In measure after measure of the Air Resources Act, the power handed out to the District and its fellow agencies is confined to jurisdiction over the nonvehicular portion of the state's pollution sources -- a domain smaller than what the District lays claim to, but sizeable nonetheless. Such limits are found, for example, in section 24260 of the Health and Safety Code which restricts the powers of the pollution control boards to the promulgation and enforcement of rules, regulations, and orders necessary or proper to achieve the purpose of curbing "nonvehicular sources of air contaminants." Similar provisions, sections 24224 and 24355.2, similarly circumscribe the duties and powers of APCD control officers. More obliquely, but nonetheless clearly, sections 39057 and 39078 et seq. limit the

power of the local districts to create emission standards for lead and other air pollutants to those having nonvehicular sources.

As a final argument, the District submits the proposition that the Attorney General and the California Air Resources Board have consistently adhered to the view that the regulation of the lead content of gasoline is within the authority of the air pollution control districts. This is the interpretation which these authorities have put upon the provisions of the Air Resources Act (Health & Saf. Code, § 39000 et seq.). The District maintains that, under the authority of Rivera v. City of Fresno, 6 Cal.3d 132, 140, the opinions of the Attorney General and of the Board must be given great weight in the resolution of this appeal, inasmuch as it turns upon the interpretation of the same statutes. While this may be so, the fact remains that these opinions do not constitute controlling authority in the disposition of this case. That authority rests in the statutes themselves; and their meaning and effect, as developed earlier in this opinion, is clearly the contrary of what the Attorney General and the Air Resources Board hold. Our obligation is not to imitate their error, but to correct it.

In the case at bar, we are invited to sustain a rule which is unsupported by the language of any statute or the

decision of any court, and against which is ranged the entire weight of all existing authority. In such a case, there can be but one result.

The judgment is affirmed.

CERTIFIED FOR PUBLICATION.

/s/ Kerriqan Acting P.J.

We concur:

/s/ Gabbert J.*

/s/ Kaufman J.

* Retired Justice of the Court of Appeal sitting under assignment by the Chairman of the Judicial Council.

APPENDIX L

POTENTIAL CONFLICTS WITH OTHER PROGRAMS

The overall success in achieving and maintaining air quality will depend in part on possible conflicts and interactions with other environmental goals. This results from two general factors. First, some types of control technology result in the transfer of air pollutants to another medium. For instance, wet scrubbers result in a wash water to be disposed of, and electrostatic precipitators discharge solid wastes. Second, and perhaps more important for San Diego County, is the propensity of other environmental programs to induce or inhibit growth. The availability of services such as water, sewer, and solid waste removal strongly affect the location and magnitude of urban and suburban growth. If such services promote, for example, "bedroom" communities, that is, suburbs with little or no local employment, then commuting long distances to work adds increased air pollutant loads to the basin. Since the current clean up of new and existing automobiles alone cannot be expected to reduce reactive hydrocarbons to levels required for air quality standards to be met, anything which promotes VMT increases in the country will magnify the problem. Since most of the larger stationary sources are coming under progressively stricter controls, minor dispersed contributors such as motorcycles, lawnmowers, etc. become important. With all the easy control measures exhausted, some measures to dampen growth will become necessary if air quality is not to deteriorate.

L-1 Water Supply

The majority of water used in the San Diego region, about 560,000 acre-feet in 1970, is imported (L-3). Only about 14% of the water is obtained from local surface supplies, and 23% from groundwater reservoirs. Presently, Colorado River water is delivered from the Colorado aquaduct at San Jacinto to two San Diego aquaducts under contractual arrangements with the Metropolitan Water District of Southern California (SCMWD). (See Figure L-1) Although Colorado water is of good quality at present, total dissolved solids (about 750 ppm) and hardness are slowly increasing. Streams in the region are ephemeral in nature and potential storage reservoirs are essentially fully developed. Ground water quality varies but is generally lower than imported Colorado water. The State water project (L-4) is scheduled to bring northern California water to the San Diego aquaduct starting in 1975, although complete blending of northern and Colorado water may not start at that time.

The Colorado River Basin Project Act of 1968 (L-4) apportioned to Arizona, Nevada, and California, water from the Colorado River based on the 1964 Supreme Court decision. Specifically, California was assigned 4.4 million acre-feet per year plus a percentage of excess available, with supplies to the SCMWD to be reduced from 1.2 million acre-feet to 0.55 million acre-feet after completion of the central Arizona project. Hence, the necessity of northern California water for the Southern California Region. The exact timing of the central Arizona Project is not certain at this time, however.

The magnitude of projected population in the county varies with different sources of the estimates (see Appendix B, for instance). In the water supply area, a recent survey by San Diego County Water Authority (SDCWA) (L-5) of local contracting agencies which supply filtered water for public use showed that water requests were equivalent to a total population of 2.7 million in 1990 compared to the comprehensive planning agency (CPO) estimate of 2.29 million. Assumed is a constant per capita consumption of 0.25 acre-feet per year. SDCWA has adopted the CPO estimate for its planning purposes, (L-5) thus bringing some consistency to water supply planning. Being service oriented and mandated by law, water utilities like SDCWA cannot deal with side issues such as air quality, and are as likely to induce as to slow down the growth of suburbs. Water supply for the future will involve only small direct air quality impacts, mainly construction activities and fuel use for pumping and potable water treatment.

The San Diego Regional Water Quality Control Board has also made projections of water supply and demand based on Dept. of Finance E-0 and D-150 population projections for the San Diego County (see Appendix B for details of population projections). As mentioned previously, essentially all local surface and ground water is developed, so that imported water is projected to increase by factors of 2.0 and 2.3 by the year 2000, respectively, under the two population estimates. Reclaimed water is to increase by a factor of 10 under both assumptions about population growth. As to use of this water, agriculture, which currently accounts for a third of water use, is seen to increase slightly for the next decade, then dropping off somewhat by 2000. The dramatic increase is in urban use, as might be expected.

L-1.2 Waste Water Treatment and Water Quality

Several state and federal laws affect water supply and water quality in the San Diego Region.

The National Environmental Policy Act (requiring impact statements for projects involving federal support) and the Federal Water Pollution Control (L-14) Act (FWPCA) of 1972 are the primary national laws dealing

with water supply and quality. Analogous legislation at the State level includes the California Environmental Quality Act (CEQA) and the Porter-Cologne Water Quality Act of 1969. The California administrative code (L-13) also defines the role of the State Water Resources Control Board. The State Board and nine regional boards formulate basinwide plans, as required under Section 303 of FWPCA. Grants for wastewater treatment and related facilities are also administered by the State Board (Section 201 (L-14A) of FWPCA). At present, over 87% of the cost of wastewater treatment facilities is born by state and federal governments.

One of the few examples of policy coordination between agencies involved with environmental decision making is the current practice of the State Water Resources Board of funding waste water facilities only to the extent of E-O population projections in critical Air Basins (L-12). (San Diego County is defined by the Air Resources Board as one such basin.) This policy represents a departure from traditional thinking for agencies with a "service" orientation to the public. The board seems to recognize the partially self-fulfilling nature of projections about "needs" and "demands." By itself, the funding policy of the board is not able to resolve land use issues affecting air quality, such as the desirability of any growth in some areas, or tradeoffs involving growth between areas. Despite the lack of comprehensiveness of the policy, it is bound to have some slowing effect on urban growth for San Diego County.

The State Board has authority to deny new sewer hookups to municipal systems until treatment capacity is increased or upgraded. Although a current sewer connection moratorium is in effect in the Santee-Lakeside area, it appears the decision is related to a public health nuisance from mosquitos downstream on the San Diego River rather than a concerted attempt to control growth in the suburban area

At the Regional level, the San Diego Basin Regional Water Quality Control Board has developed a comprehensive water quality control plan, (L-3) in compliance with state and federal legislation described above. A brief sketch of this plan is given here in the context of possible interactions with the air resource and air quality maintenance. In the San Diego Water Basin (definition also includes portions of Riverside and Orange Counties) (See Figure L-1) the lower San Diego hydrographic subunit,

San Diego Bay, and two north county subunits are recognized by the State Board as water quality class units - that is, segments known to exceed current water quality standards and expected to exceed standards even after effluent limitations (see Figure L-1). The Regional Board has also asked that several coastal lagoons be added to this list. All other waters in the county are "effluent class segments," meaning that water quality can be met by limiting of inputs (FWPCA Section 303). The Pacific Ocean is classified as "effluent limiting." Eutrophication presents the major problem for surface waters and coastal lagoons, while San Diego Bay is unable to assimilate the current thermal load.

As specified in Section 402 (L-14C), FWPCA, best available treatment for discrete industrial sources is required by the board by 1983, while non-discrete sources must comply with compatibility requirements for discharge to municipal sewers. Reclamation is emphasized for inland treatment plants, with some reinjection of sludges to the metro system for San Diego City area. Secondary treatment is required for all plants in the future, including the largest in the county, Point Loma. Sludge is to be disposed of on land rather than ocean outfall. Table L-1 shows the total municipal wastewater expected in San Diego region through the year 2000.

Table L-1

YEAR	FLOW (MGD)	BOD (Tons per day)	TSS	TDS
1970	122	75	39	818
1980	175	15	15	614
2000	287	21	25	841

The improvement in quality reflects both the secondary treatment requirement (required by Section 301, FWPCA) and the lower dissolved solids of imported northern California water. The Regional Board has also requested some autonomy from Section 208 requirements of regional treatment in order not to discourage local reclamation projects.

Direct effects of any air quality maintenance program on water quality are generally less important than factors inducing or inhibiting growth. Since oxidant is the major air pollutant requiring control in San Diego County, limitations of reactive hydrocarbons will receive most emphasis.

Only a few stationary sources emit significant amounts of hydrocarbons, and these will generally use vapor recovery systems, floating covers for storage, mechanical systems, or combustion systems for control of emissions. None of these processes result in the discharge of much wastewater. Control of hydrocarbons and carbon monoxide from mobile sources, requiring both controls on new and existing vehicles, and on the number of vehicle mile travelled, are not expected to affect water quality in a direct sense. Rather, the impact on population distribution and growth will affect potable water demands and required wastewater treatment facilities. Control of suspended particulates can be seen to have some influence on water quality due to the use of such devices as scrubbing systems, especially in the minerals industry. The quantities involved are not particularly large, however. Additional water may be required for control of dust from the minerals industries or for minimizing construction born emissions. Particulate (and NO_x) emissions are currently controlled from power plants by combustion modifications, rather than by "add on" controls.

The increase in treated sewage sludges and solids, resulting from both increased population and better treatment, present a possible air pollutant source since ocean disposal of such materials is to be phased out under the ocean plan. In land plants many also reinject treated sludges into the metro system, increasing the load at Point Loma. Incineration is generally not part of land disposal plants. A combination of landfill and fertilizer (soil conditioner) use will be the ultimate fate of these sludges. Impacts directly on air quality will be limited to possible local odors. The water plan for the region thus seems to present few direct conflicts with air quality. Moreover, growth inhibition through treatment plant funding and sewer connection moratoriums may help out in meeting air quality objectives.

L- 1.3 Coastal Zone Commission

Proposition 20, which passed during the election of November 1972, established the California Coastal Zone Conservation Commission, along with six regional commissions. The purpose of this legislation was to prepare a comprehensive plan for the coast zone environment, to be submitted to the legislature in 1976 for approval. The Commission also is

charged with issuing permits for development projects within 1000 yards of the coastline. Currently, the San Diego Regional Commission is preparing a series of reports to be synthesized into the plan for the future of the entire California coast. One report in this series, (L-10) dealing with the land environment, in San Diego County, has some policies and recommendations regarding air quality. Cited are meteorological conditions which often confine air pollutants to small areas near the coast, especially in winter. In the summer, on the other hand, low clouds and fog prevent local photochemical smog, although emissions near the coast may drift to sunny inland areas and contribute to oxidant concentrations there. Mobile source emissions are recognized as the major factor involved in coastal air pollution. The recommendations therefore include exclusion of major highways from the immediate coastal environment, while maintaining recreational access to beaches. Public use of ocean resources for recreational purposes should be included in any transportation plan, and the private automobile is assumed to continue to be the mode which the public will use for such travel.

Regarding stationary sources, the long range goal is to phase out industrial pollutant sources from the coast zone. Also, no new power generating stations are to be built on the coast, and expansion of existing plants is subject to cumulative air pollutant effects on public health and other coastal resources. Agricultural resources are heavily emphasized in the San Diego County coastal zone. The Commission recognizes both the direct effects of air pollutants and increasing consumption of agricultural land by urban and suburban growth, with consequent air pollution. The coastal land report also deals with industries such as sand and gravel operations and effects on beach sand supply. Regulations on the location and magnitude of these industries may affect air quality, especially particulates.

Although the coastal zone commission has not finalized its policies, it does not appear that its decisions will represent comprehensive planning with regard to air pollution. Despite the concern shown for air pollution in the coastal land environment report, the commission lacks expertise in the field. The broad nature of its jurisdiction and responsibilities will probably result in air pollution being only one of a series of factors

involved in any decision. Although some of the goals involved in air and water quality are perfectly in line with policy statements so far by the regional commission, the net effect if these policies are implemented may be to transfer problems inland. The recreational access emphasized by the commission, laudable though this goal is, suggests problems with road and freeway siting. How this will be resolved and the effects on VMT and air quality are unclear.

As mentioned in Section 2.3.5, the Navy presents jurisdictional problems for the coastal commission. Also, the Navy has not filed an Environmental Impact Statement for its master plan. Presumably, the commission would have to appeal to EPA if the Navy conducted its business contrary to the commission policies. Navy activities also induce certain support service growth along the coast, with uncertain effects on air quality.

The coastal commission has recently followed through on its ocean discharge policy by recommending that the Point Loma treatment plant be limited to serving the present population level until a long range population study for the area is done.

It should be noted that the coastal commission is relatively new and policies are still being refined. In addition, the final plan must be approved by the legislature, and the commission's recommendations may be tempered by political realities as impacts on the local economies becomes clearer. In summary, the coastal zone commission's preliminary policies are generally consistent with air quality goals along the coast but the ability to implement these policies and the effects inland remain uncertain.

L-1.4 Electric Power Generation

Electric power production presents a number of questions for both air and water quality in San Diego county. Despite the water quality class status of San Diego Bay mentioned before, the regional board has recommended exemption of existing power plants there from the thermal plan. San Diego Gas and Electric currently has a county wide base load generating capacity of about 1700 megawatts, roughly 1000 of which is on San Diego Bay. Also planned is a 300 megawatt expansion of the Encina facility at Carlsbad (L-9). Some inland sites are currently being investigated for future

generating stations, but no firm plans exist at present. Steps taken to date in compliance with APCD regulations (L-11) have generally involved combustion modification and have not generated wastewater. Since both the WRCB Ocean Plan and the regulations of the Coastal Commission will probably prohibit locating of fossil fueled generating stations on the coast, increased local air pollution loads (not necessarily hydrocarbons) inland will result from future fossil fueled power generation. Policy regarding nuclear power plants is undecided at this time. Power production illustrates better than other industries the lack of mechanisms for internalizing the tradeoffs necessary for overall environmental improvement. The location of power plants inland with consequent efficiency losses from closed cycle cooling will result in more fuel burned (and more emissions) per unit of output. Combustion modifications also decrease generating efficiency as a trade-off for air quality. One option for both air and water quality improvement would be to import power. (Currently about 180 megawatts are imported.) But some of the problems merely move to the northwest, or perhaps Arizona and New Mexico. Clearly, air quality maintenance with respect to power production involves administrative powers and structure not currently in existence.

L-1.5 Assembly Bill 3421

An interesting piece of proposed legislation having implications for both air and water quality is Assembly Bill 3421, (L-6). Essentially this bill would consolidate the ARG, WRCB, Solid Waste Management Board, State Transportation Board, and the Division of Transportation Planning, into the State Resources Conservation Board and 8 Regional Boards. At a later date, the Coastal Commission might be included. The thrust of this legislation is to incorporate various environmental considerations into overall land use planning. Policies such as the funding practices of the WRCB would thus become an integral part of the environmental planning process, and would perhaps eliminate potential conflicts at an early stage. Moreover, since control of pollution is often accompanied by a transfer from one medium to another (i.e., air to water), tradeoffs could be more easily made under a consolidated agency than from several single purpose agencies. AB 3421 would not change existing powers, but rather attempt to coordinate the exercise of these powers. Disfunctional geographic boundaries between agencies such as the air basin vs. water basin would be made more manageable.

Regional boards are necessary to retain local input and deal with problems of strictly local nature. On the negative side, it is not apparent that consolidation of environmental agencies will be more effective directing or dampening urban growth.

L-1.6 Solid Waste Disposal

The majority of municipal solid wastes in the county are currently disposed of by sanitary landfill methods (L-7). Open burning of refuse is limited to small and isolated sites, and agricultural burning is regulated by the San Diego APCD. A comprehensive plan for solid waste management in the county is currently being prepared, according to the requirements of the Nejedly-Z'berg Solid Waste Management and Resource Recovery Act of 1972 (L-8). The State Solid Waste Management Board, created by the Act, is to review plans submitted by local governments. In addition to health and sanitation regulations, plans are to recognize state water quality and national air quality control plans. Guidelines for solid waste plan development require permit systems for waste handlers and disposal site operators. Reclamation is to be planned for and encouraged for both materials and energy.

The direct impacts of solid waste disposal on air quality, and conversely, are likely to be small. Control, for instance of particulates from stationary sources will generate some solid wastes. Little conflict is apparent between air quality and current disposal practices, since open burning is not permitted and only small amounts of solid wastes are incinerated in the county. A retrofit program for automobiles will probably generate only slightly more "junk" parts that would occur normally. VMT from disposal service vehicles is probably a larger emission source than any other from solid waste programs.

Although the detailed plan for San Diego County is unavailable at this time, the guidelines for preparation suggest some problems with air quality, especially regarding urban growth. One is the preservation of local control of solid waste management. Despite this tradition and its administrative simplicity, it seems unlikely that local government can effectively deal with complex growth issues. Local economic pressures have often encouraged growth, expecting services such as solid waste disposal and handling, to

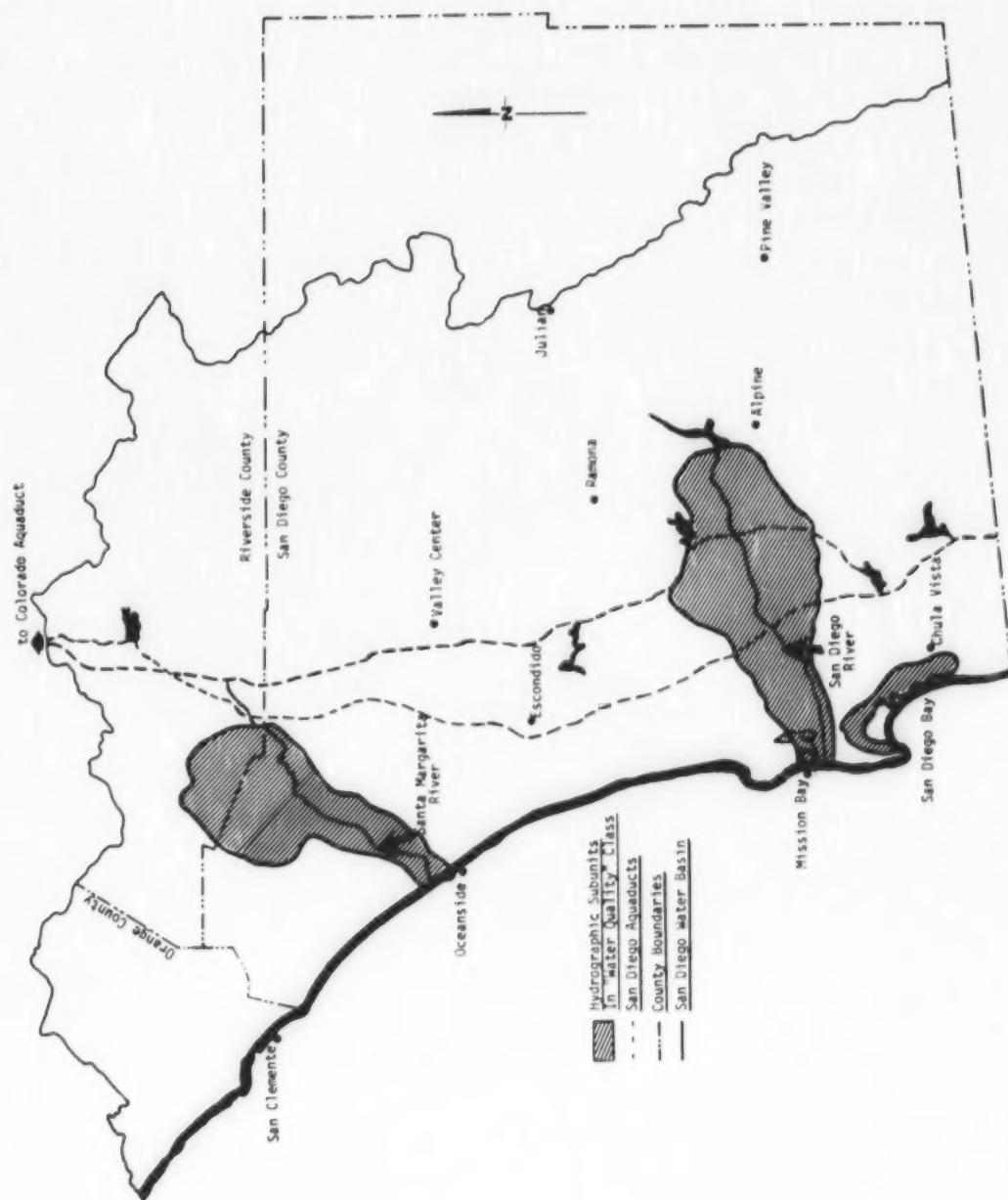


Figure L-1. San Diego Water Basin

follow. In this regard, the guidelines prescribe that State Department of Finance projections of population growth, without stating which series to use. The local area is apparently free to choose the higher population projection if growth is viewed as desirable. Another problem is, that although solid waste planning is to recognize air and water quality plans, no mechanism is incorporated to deal with urban growth which might be in conflict with such plans. In addition, financial arrangements are, by and large, left to local agencies to decide. If past experience is a guide, the additional costs, both direct and indirect, of future solid waste disposal will not be internalized to the producers of such wastes. For instance, the expanded capital costs of a solid waste system for a new subdivision will most likely be recovered from property owners in the future, rather than from the developer at the time of construction.

As was mentioned under water quality, AB 3421 would incorporate the Solid Waste Management Board into the proposed Resource Conservation Board. The Regional Conservation Board would perhaps be more likely to address conflicts and interaction between environmental problems.

With or without this legislation, the current city/county arrangement, with inputs from CPO would largely be preserved. Further comments about possible conflicts of air quality maintenance with solid waste disposal should be reserved until the plan being prepared is available.

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- L-13. Title 23, Chapter 3 of the California Administrative Code contains administrative procedures for the waste water resources control board. Sections 2500 to 2550 define a program to control solid wastes. Title 17, public health covers water quality for domestic use and reclaimed water.

L-14. Federal Water Pollution Control Act (PL 92-500), October 18, 1972.

- a. Section 201 -- defines best practicable waste treatment for municipal facilities receiving Federal grants. The administrator shall encourage waste treatment management which emphasizes recycling and reclamation of waste water and sludges in an environmentally acceptable manner.
- b. Section 208 -- resources designation of areas which would benefit from area-wide waste treatment, being consistent with the basin-wide plan (Section 303).
- c. Section 301 -- defines effluent limitations, requiring best practicable control technology by July 1, 1977 and best available technology by July 1, 1983.
- d. Section 303 -- requires basin-wide planning by states in order to achieve water quality standards. Daily maximum pollutant loads for surface waters (including thermal load) are to be determined. Waters are to be classified as to current and expected loads. A compliance schedule for direct and indirect sources is required.